Intel Core i7-970 | Western Digital TV Live Plus | Asus ENGTX460 DirectCU TOP

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CORSAIR HYDRO SERIES H70
PAGE 28

THE DRIVE TO IMPROVE: SSD TIPS & TWEAKS
PAGE 31

MEASURE YOUR MEGS: BROADBAND TESTING TOOLS
PAGE 79

HULU PLUS: BECAUSE THERE'S NO R IN "FEE"
PAGE 88

SWEET 16 DREAM PCs 2010
PAGE 50

BENCH RACER
PAGE 34

Q&A WITH MARK COKER
SMASHWORDS' CEO REWRITES THE BOOK ON BOOKS
PAGE 110

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CPU
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October 2010 • Vol 10 Issue 10

SPOTLIGHT

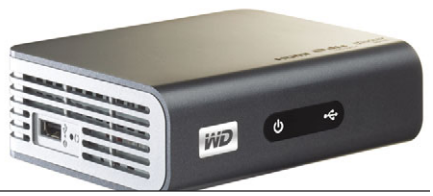
50 Dream PCs
The Ultimate System Showdown

Frontside

8 What's Happening
15 Digital Economy

Heavy Gear

18 Dream Hardware
20 Nvidia 3D Vision Surround
Three Monitors, Three Dimensions & Big Bucks
22 In Win Dragon Slayer
Sentey SS1-2422
24 Logisys 2.4GHz Wireless 800/1600 DPI Switchable Mouse
Asus ENGTX460 DirectCU TOP
25 Intel Core i7-970
Western Digital TV Live Plus
28 Corsair Hydro Series H70
NZXT Phantom
30 Lian Li PC-T60
ViewSonic VG2428wm



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Hard Hat Area

PC Modder
31 **Solid-State Storage 101**
SSD Tips, Tricks & Tweaks
34 **Mad Reader Mod**
Bench Racer
36 **Modders-Inc.com Hot Rod Mod-Off**
Four Men Enter, One Man Leaves

40 **Advanced Q&A Corner**
42 **X-ray Vision: Micropelt's TE-Power Node**
Creating "Green" Power From Excess Heat
44 **White Paper: OASIS**
Meet The World's Smartest Countertop

Loading Zone

76 **The Bleeding Edge Of Software**
Inside The World Of Betas
78 **Up To Speed**
Upgrades That'll Keep You Humming Along
79 **Broadband Benchmarking**
Tools To Measure Your Mbps
82 Sony Vegas Movie Studio HD Platinum Production Suite
Immunet Protect Free 2.0.11.12
84 soft Xpansion Perfect PDF 6 Editor 6.3.9
Nitro PDF Reader 1 Beta
85 **Open Sores**
Linux Helps Level The Technological Playing Field For Developing Nations

Digital Living

88 **Hulu Plus**
Can Hulu Beat Itself At Its Own Game?
92 **At Your Leisure**
PC & Console Games & Gear
96 **The Cutting Edge**
When Bigger Was Better

Tips & Tricks

97 **Software Tips & Projects**
Expand Your Windows 7 Bag Of Tricks

What's Cooking

100 **Shavings From The Rumour Mill**
Real Competition Is Finally Coming To CPU Market
102 **Technically Speaking**
An Interview With Airvana's Josh Adelson
105 **Under Development**
A Peek At What's Brewing In The Laboratory

Back Door

110 **Q&A With Mark Coker**
Smashwords' CEO Rewrites The Book On Books

Infinite Loop

Strange stats and other oddball items from computing's periphery.
pages 98

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Editor's Note

Just as we realize that we've endured about as much of the blazing hot summer as we can possibly stand and autumn is finally in view, our thoughts turn to new pursuits, such as . . . . Well, OK, maybe our thoughts stay on many of the same pursuits we've been focusing on all summer; building, modding, tweaking, installing, and benchmarking.

This month in *CPU*, we have taken a look at 16 PCs from a variety of builders in three price categories. We think you'll find the results interesting (starting on page 50) whether you're in the market for a new PC yourself, you have a friend or loved one who needs a new PC, or you just love checking out the parts and configs your favorite integrator uses and seeing how they fared when put to a battery of benchmark tests.

Also in this issue, check out our look at Nvidia's 3D Vision Surround (page 20), our roundup of broadband testing tools (page 79), and Marco's advice for folks looking to tweak their SSDs' performance and extend their longevity (page 31). After all, you can never have too much of a good thing.

One last thing: If you're a fan of immaculately and skillfully modded PCs, be sure and stop by page 36, where we briefly introduce you to each of the staffers/admins at Modders-inc.com, who are currently locked in a titanic struggle to create the coolest hot rod-themed PC mod. We'll most likely have the results of that contest for you via pictures and words in our November issue, and we'll be heading back to one of our most popular cover topics: *CPU*'s annual software issue.

Until then, enjoy the cooler temperatures, the football, and the rest of the good stuff that shows up each year in the fall.

Chris Trumble, Publication Editor, *CPU*

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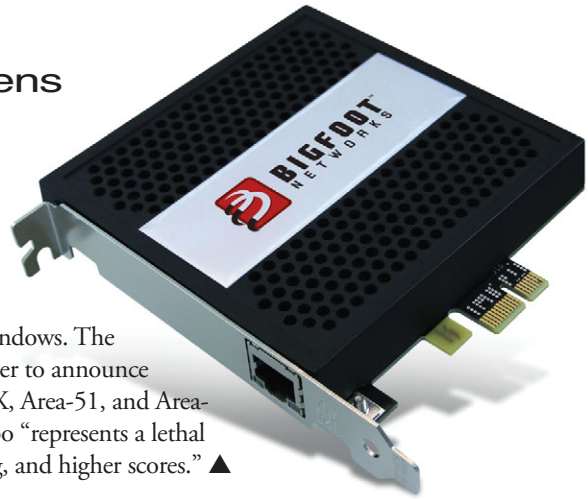
Bigfoot Networks Cozies Up To Aliens



Bigfoot Networks may not be a household name among general PC consumers, but in hardcore gaming circles the company's gaming network cards have earned a solid reputation, including the company's latest effort, the Killer 2100. Unlike "dumb" NICs that cause "huge, unpredictable latency spikes" during gameplay, Bigfoot states that the Killer 2100 "has latency in microseconds" thanks to its NPU (Network Processing Unit) that offloads game data from the CPU and Windows. The card evidently impressed Alienware enough for the game system builder to announce in mid-August that it's offering the Killer 2100 in Aurora, Aurora ALX, Area-51, and Area-51 ALX systems. Alienware's Frank Azor stated the NIC-system combo "represents a lethal combination—maximizing performance for more frags, faster leveling, and higher scores." ▲

DARPA Introducing ExtremeScale Supercomputing

You know about Moore's Law and the power-consumption, programming, and architectural roadblocks making it more difficult to double the number of transistors on an integrated circuit approximately every two years. So does DARPA. Thus, the agency recently announced a UHPC (Ubiquitous High Performance Computing) program that "directly addresses major priorities expressed by President Obama's 'Strategy for American Innovation,'" including the exascale supercomputing Century Grand Challenge, energy-efficient computing, and worker productivity. With the goal to "reinvent computing," UHPC will involve developing "radically new computer architectures and programming models that deliver 100 to 1,000 times more performance" but are easier to program than present systems. Intel, Nvidia, MIT, and Sandia National Laboratory have been tabbed to build UHPC prototypes by 2018. ▲

Samsung Touts 3D First; Should You Care?

Samsung's BD-C8000 ($499.99) may very well be the "world's first portable Blu-ray player with 3D capability," but don't get too excited just yet. Although the netbook-looking BD-C8000 will give you 1080P HD video on its 10.3-inch screen, what it won't give you is 3D viewing while on the go. For that ability, you'll need to connect the player (HDMI 1.4a integrated) to a 3DTV. On the plus side, the BD-C8000 does build in Wi-Fi and is Netflix-ready. It also includes 1GB built-in storage and access to the various goodies that make up Samsung Apps (YouTube, Twitter, Flickr, Pandora, etc.). Battery life, meanwhile, is rated at three hours. ▲

Watching The Chips Fall

Here is the pricing information for various AMD and Intel CPUs.

CPU	Released	Original Price	June 2010 Company Pricing	NewEgg.com Retail Price*
AMD Phenom II X6 1090T (Black Edition)	4/27/2010	$295	$295**	$295.99
AMD Phenom II X6 1055T	4/27/2010	$199**	$199**	$199.99
AMD Phenom II X4 965 (Black Edition)	8/13/2009	$245	$165**	$165.99
AMD Phenom II X4 955 (Black Edition)	4/23/2009	$245	$145**	$152.99
AMD Phenom II X4 945	11/4/2009	$165**	$145**	$135.99
AMD Phenom II X2 555 (Black Edition)	1/25/2010	$105	$93**	$92.99
AMD Phenom II X2 550	11/4/2009	$93	$93**	$87.99
AMD Athlon II X4 Quad-Core 640	5/10/2010	$122**	$99.99**	$105.99
AMD Athlon II X4 Quad-Core 635	1/25/2010	$119	$99.99**	$99
AMD Athlon II X3 Triple-Core 445	5/10/2010	$87**	$76**	$80.99
Intel Core i7-980X Extreme Edition	3/11/2010	$999**	$999**	$999.99
Intel Core i7-975 Extreme Edition	6/2/2009	$999**	$999**	$1,039.99
Intel Core i7-970	7/18/2010	$885**	$885**	$899.99
Intel Core i7-930	Q1 2010	$294**	$294**	$289.99
Intel Core i7-875K	5/28/2010	$342**	$342**	$329.99
Intel Core i5-760	7/18/2010	$205**	$205**	$209.99
Intel Core i5-750	9/8/2009	$196**	$196**	$194.99
Intel Core i5-655K	5/28/2010	$216**	$216**	$209.99
Intel Core i3-550	Q2 2010	$138**	$138**	$149.99
Intel Core i3-540	Q1 2010	$133**	$117**	$124.99

* As of August 2010

** Manufacturer's estimated price per 1,000

Swiftpoint Bypasses The Touchpad

New Zealand-based Swiftpoint promises that its itty, bitty 1,000dpi optical mouse ($69.95) will "change the way you use your laptop forever," and it may be right. Designed to work on a notebook's palmrest, the impish rodent is said to be 30 to 40% more efficient than a touchpad and accurate enough for graphic design and gaming tasks. Further, beyond providing a scroll wheel (zooming and paging), the mouse magnetically docks to its USB micro receiver during travel. Better, a 30-second charge provides an hour of mousing, while a full charge gives you three weeks' usage. The mouse's best feature, however, is arguably the pen-like grip you'll use, which is both intuitive and wards off hand cramps, Swiftpoint claims. ▲

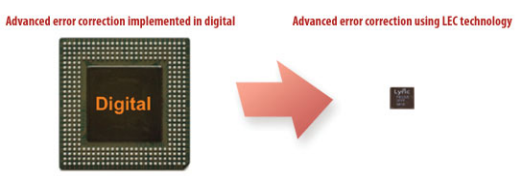
HARDWARE MOLE

Shure Grows Up With SRH240m+

We're not shy about admitting our long-time love affair with the "sound isolating" earbuds that Shure has turned out over the years. The company's midrange E3c buds have found a home in our ears for years, and for the longest time, the nearly $500 E500PTH were the best buds our ears had ever experienced. Although we've yet to slip on the company's new SRH240m+ ($79.99), we're excited at the prospect for more reasons than one, including that the SRH240m+ represent Shure's first over-the-ear effort for mobile devices and specifically those from Apple. Beyond integrating a three-button remote-mic unit in the cord to handle calls and control volume, the cups pack 40mm neodymium drivers for full bass, mids, and highs. The ear pads, meanwhile, are conveniently replaceable. ▲

Lyric Sings Probability Processing

Lyric Semiconductor "emerged from stealth mode" in mid-August to detail its probability processing technology, which is "poised to deliver a fundamental change in processing performance and power consumption." Compared to digital computer principles that systems have been based on for 60-plus years, Lyric states, its logic gate circuit "uses transistors as dimmer switches instead of as on/off switches." Thus, circuits accept "inputs and calculate outputs that are between 0 and 1, directly representing probabilities—levels of certainty." The technology is available in Lyric's LEC (Lyric Error Correction) for flash memory offering "30X reduction in die size and 12X improvement in power consumption all at higher throughput compared to today's digital solutions." A "general-purpose programmable probability processing platform" called GP5, meanwhile, could enable performance gains of 1,000X over today's x86-based systems. GP5 chip samples are expected in 2013. ▲



Will Apple Get Liquified?

Apple inked a deal with Liquidmetal Technologies recently that gives it "a perpetual, worldwide, fully paid, exclusive license to commercialize" Liquidmetal's "amorphous metal alloys" technology "in the field of consumer electronic products." In other words, it's possible that everything from MacBooks to iPod cases could sport really cool-looking, super-hard cases. On its Web site, Liquidmetal states that its "alloys represent the first enabling materials technology since the creation of thermoplastics and possess characteristics that make them superior in many ways to other commercially viable materials." Some of those characteristics include high yield strength and hardness, a superior strength-to-weight ratio and elastic limit, high wear-resistance, and unique acoustical properties. ▲

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• Intel® Core™ i5-655K Processor	$729
• Intel® Core™ i5-650 Processor	$699
• Intel® Core™ i3-540 Processor	$629

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deviantART Celebrates Birthday With Muro

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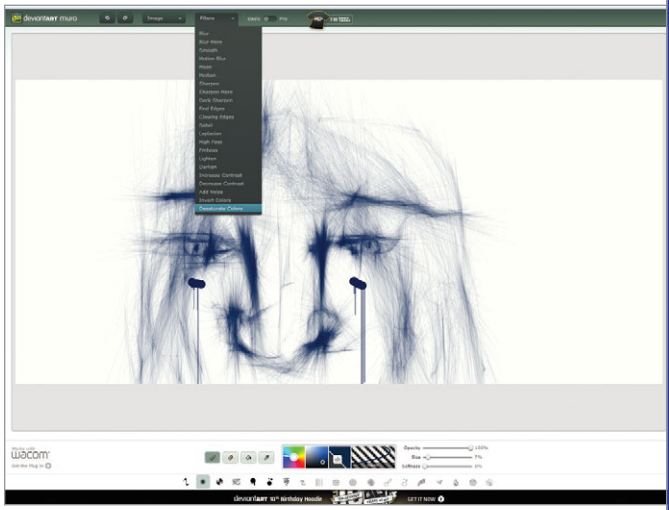


Apple Tosses Grooveshark From Its Tank

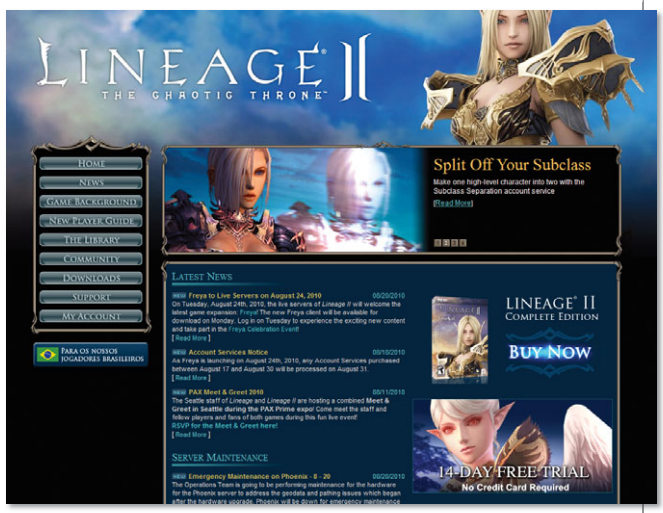
First Apple ripped the beloved Lala.com from our clutches. Now, it's pulled the hook on Grooveshark, another favorite music-streaming service. Actually, Apple kicked Grooveshark's iPhone app to the curb roughly a week after its Aug. 8 App Store debut reportedly after Universal Music Group UK voiced its disapproval. Grooveshark says it spent a year prior to the August launch reworking the app after Apple initially rejected it. Universal's beef apparently revolved around copyrights tied to its pre-1972 music catalog, which streaming tracks from Grooveshark allegedly infringed upon. Grooveshark blogged that Apple's move "comes as an absolute surprise to us, and we are not sleeping until we figure out exactly how to fix this—and get Grooveshark for iPhone back in the App Store." It added that those who had already downloaded the app could "keep enjoying it." ▲

IT Pros Aren't Following The Rules

"Employees will almost always take the path of least resistance, even if that unintentionally means violating company policies and breaking security protocols," says Frank Kenney, vice president of global strategy at Ipswitch. You can count IT professionals among those employees. According to a survey the company conducted of roughly 130 IT pros, about 40% copped to sending sensitive or confidential data via personal email accounts in an effort to cover their tracks. Elsewhere, about 70% admitted to sending payroll, customer data, financial information, and other classified goods via unsecured email at least once monthly; 34% admitted doing it daily. Of companies with file-transferring policies (about 62%), Ipswitch found that 72% don't have the means to see files coming in and out. ▲

SOFTWARE SHORTS

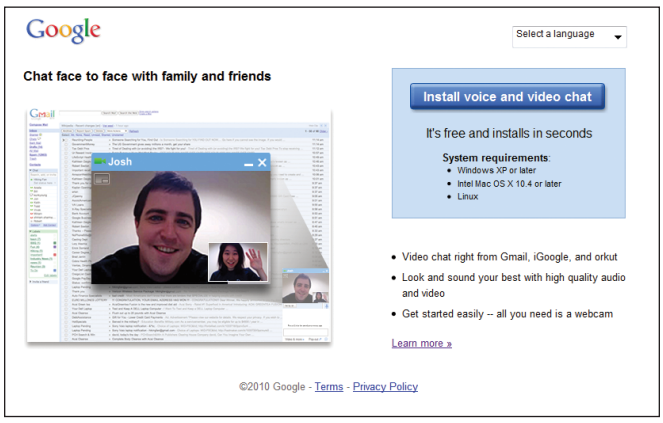
"You Addicted Me To Your Game"



We don't know what's more disturbing: the fact that Hawaii resident Craig Smallwood reportedly played 20,000 hours of Lineage II between 2004 and 2009 or that he's filed a lawsuit in U.S. District Court against the game's Korean publisher, NCsoft, alleging he's so addicted to the game that he's "unable to function independently in usual daily activities such as getting up, getting dressed, bathing, or communicating with family and friends." Smallwood also alleges that if he'd known his fate, he wouldn't have started playing to begin with. He's seeking unspecified monetary damages based on claims that NCsoft "acted negligently" by not warning or instructing players of Lineage II's "dangerous and defective characteristics." NCsoft has asked the charges be dismissed, but in August, U.S. District Judge Alan Kay refused to do as much for all of Smallwood's claims, meaning a trial is possible. ▲

Time To Get Chatty, Linux Lovers

It took nearly two years, but Linux users can now get vocal via Gmail voice and video chat. Google's Tristan Schmelcher blogged that the Linux addition was "our top video chat request." Just go to gmail.com/videochat and download the related plug-in, which makes chats available also from iGoogle and orkut. Ubuntu and other Debian-based distros are supported, and Justin Uberti of Google Realtime Communications blogged that "for those of you using RedHat-based distros, we're planning on adding RPM support soon, as well." Uberti added that "significant engineering" went into developing "an all-new video-rendering solution and an all-new PulseAudio-based audio handler." Additionally, "work to support 64-bit and countless Web cam compatibility tests" were required. ▲



"Hopelessly Inadequate"

That's how computer scientists at Georgia Tech Research Institute characterize seven-character passwords, even when containing symbols and alphanumerical characters. The BBC reported that's due to "the growing number of processors on graphics cards" that will "soon make it trivial for them to crack short passwords." Georgia Tech's Richard Boyd and others have been studying possible effects that modern graphics cards' number-crunching abilities can have on cracking passwords. According to Boyd, modern cards' number-crunching abilities are comparable to multimillion-dollar supercomputers from a decade ago, and parallel processing systems in such cards are very good at executing brute-force attacks that "effectively try every possible combination of letters and numbers until the right one is found." Ultimately, the researchers suggest we could be forced to use entire sentences to access online services. ▲

5 Billion & Counting

By now, the 5 billionth device should have been connected to the Internet, according to IMS Research data. The company states, however, that the "second wave of connected device growth is accelerating" and will be "followed by further growth waves in many new connected device types." By 2020, IMS forecasts that 22 billion devices will be Internet-connected, including the majority of the 6 billion-plus cell phones predicted to be in use globally. Other areas with tremendous growth potential, IMS stated, include televisions, as many of the 2.5 billion TVs now in use "will be replaced with Internet-connected sets" directly or via set-top boxes. Elsewhere, "an increasing portion of the world's 1.1 billion cars will be replaced over time by models that have Internet connectivity." ▲

The Atomic Bomb Has Nothing On The Internet

We knew that chain-smoking, authority-fighting classic rocker John Mellencamp leaned toward the cranky side. What we didn't know was how deep his crankiness ran, however, particularly toward the Internet. "I think the Internet is the most dangerous thing invented since the atomic bomb," Mellencamp recently spewed. "It's destroyed the music business. It's going to destroy the movie business." On the latter, he may have a point there. We're not so sure about the notion that "some smart people, the China-Russians or something" could bring America to its knees first by hacking our power grid or financial system. Mellencamp's technological contempt coincided with the release of "No Better Than This," his new album recorded in mono with just one microphone and a 55-year-old Ampex tape recorder. ▲

"Your Wi-Fi Is Making My Kid Sick?"

Such is the general claim of a group of Ontario parents who say their children have experienced headaches, dizziness, nausea, memory loss, insomnia, and other symptoms they believe the school district's Wi-Fi network is causing. The Canadian Press reported that the parents claim the symptoms disappeared on the weekends when the kids were away from school, pouring yet more fuel on the great "electromagnetic radiation" debate. "I'm not saying it's because of the Wi-Fi because we don't know yet, but I've pretty much eliminated every other possible source," says Rodney Palmer, a Simcoe County Safe School Committee member. Reportedly, the parents offered to pay for a wired network to supplant the Wi-Fi network but have been "ignored" thus far. ▲

SITE SEEING

YouTube Videos You'll Want To Devour

As the newly launched Devour.com states, "about 25 hours of video is uploaded to YouTube every minute." To watch every bit of those you'd need roughly 1,700 hours, "so good luck trying to find something worth watching on your lunch break." From the minds of Uncrate.com, Devour.com aims to help filter out the junk by handpicking the best of the best every weekday. The result is both stately and customizable. As Devour.com states, expect "fewer cute kittens" and "more awesome." Quality-wise, every video is in HD and iPad/iPhone compatible. What you won't get are on-site comments (you can still add your own at the video's original YouTube residence); thus, you can "enjoy the peace and quiet of not having to wade through all the brilliant critiques from this great nation's junior high masterminds." Now, that's awesome. ▲

Big Think=Big Ideas

The brainiacs behind BigThink.com believe "that not all information is equal." They also believe "that expertise is invaluable and should be shared." For example, if you "owned a business and wanted to expand into China or Russia," you'd want to hear from people who had already done that." To that end, the site launched in 2008 aims to put you in "contact with the ideas of very smart people" via countless hours of video interviews conducted with more than 1,500 experts. We're talking heavyweights here. Interviews are sorted into Arts & Culture, Business & Economics, History, Life & Death, Science & Tech, Media & Internet, and other categories. Although the vast amount of intelligence on tap is initially overwhelming in a "where do I start learning?" sense, may we suggest the "Life In 2050" special series, daily Ideafeed offerings, and excellent array of blogs. You'll feel smarter for having clicked by. ▲

Job Of The Month

If you want to be part of the iPad and tablet computing revolution, you may want to go work for Amazon; the retailer's Kindle software strategy is more agnostic in nature than is e-reader rival Apple's. The Kindle app for tablets is going head-to-head with Apple's own iBook app and other bookstore apps/readers on emerging platforms. Amazon wants a Kindle Tablet Engineer to help the company "change the way people read books on tablet computers." You will be part of a team dedicated to building Kindle apps for those other portable reading devices. You will get to target unreleased hardware and leverage those object-oriented design skills. Expect to use a range of programming languages, as well, as you help build apps that millions of readers will use.

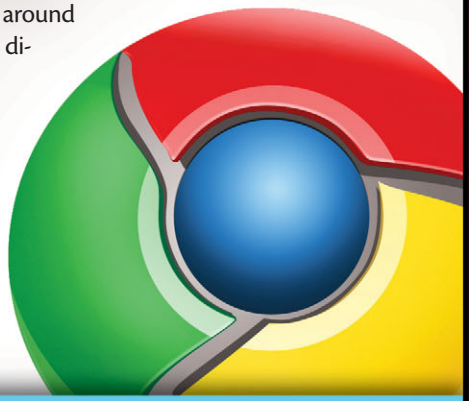
bit.ly/duPyKx

Women Leading The Social Media Revolution

Social networking has been the fastest-growing Internet activity in recent years, and according to comScore, women are at the front of the charge. The analytics company finds that 75.8% of all women online worldwide visited social networks in May 2010 compared to 69.7% of men. And when women get onto these sites they stay there, 5.5 hours per month vs. men who stick around only 4 hours per month. In North America, social networks reach 91% of all women online, second only to Latin America, where the social nets touch 94.1%.

The Web Gets More Chrome

Until this year, the browser wars appeared to have gone to the trenches among U.S. users. According to StatsCounter, Internet Explorer had been maintaining about a 55% or greater share of the market, Mozilla's Firefox hovered at just around 30%, and several others essentially shared a distant third place, dividing up the rest. But Google's Chrome browser has made a strong showing this year, growing a 5.92% share in January to a 9.48% share in August. Firefox remains popular at 27.51% of the market, and IE is still at 52.95%. On a worldwide basis, Chrome is doing even better, with 10.6% of the market. Curiously, Google may be grabbing share from Apple. StatsCounter is reporting that despite rising sales of Macs, Safari use peaked in the spring at only about 4% of the world market and about 8% in North America.



Top Ten Most Popular Twitter Users*

Account	Followers	Following	Tweets
ladygaga	5,775,977	148,313	447
britneyspears	5,715,365	419,552	433
aplusk (Ashton Kutcher)	5,586,475	597	6,135
TheEllenShow	5,087,050	43,029	2,575
BarackObama	5,079,169	716,565	873
justinbieber	4,728,68	381,942	4,699
KimKardashian	4,541,521	121	3,118
Oprah	4,075,69	919	99
taylorswift13	3,990,85	946	729
johncmayer	3,615,94	788	3,327

*TwitterCounter.com, as of August 24, 2010

RAW Numbers

145,339,538
Number of blogs on the Web as of late August
BlogPulse

86%
Percent of Chinese mobile subscribers who use SMS
Nielsen

64%
Percent of U.S. mobile subscribers who use SMS
Nielsen

56.7 million
Number of U.S. mobile video viewers projected in 2014
eMarketer

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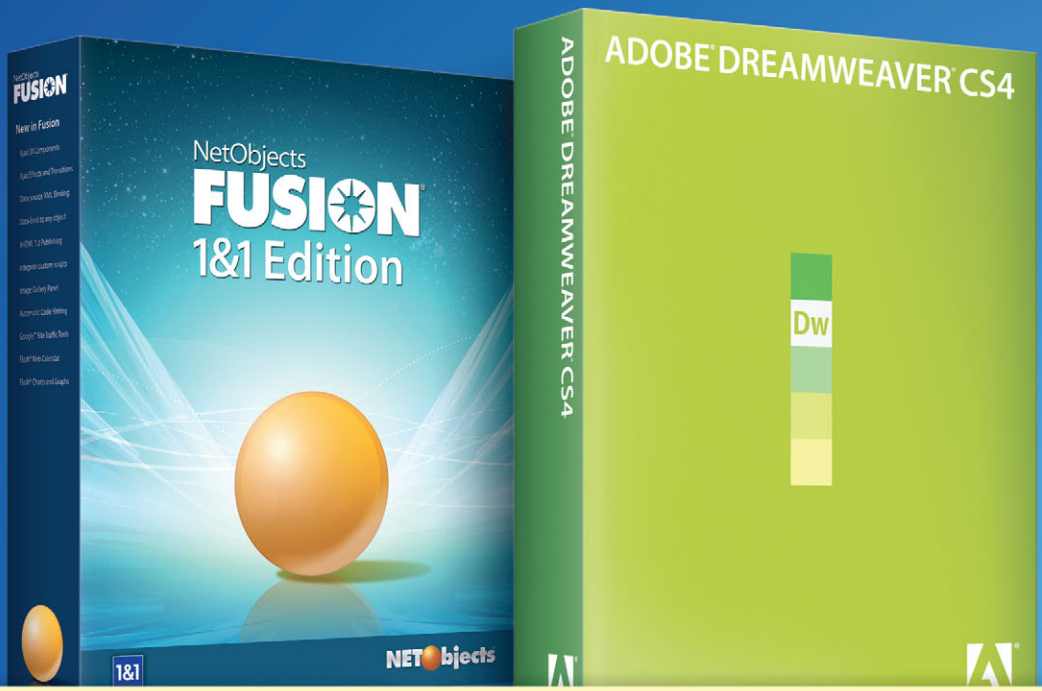
WEBSITES



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DREAM HARDWARE

Like a franchise reboot, dreamy tech is like the concept of Eternal Return with a $200 bonus for passing Go. All this has happened before and will happen again. Only kewler.

by Marty Sems

Innespace Seabreacher X

We're not sure just how Rob Innes and Dan Piazza (www.seabreacher.com) spent the mid-1970s, but we'd wager that "Jaws," "Star Wars," and "Smokey and the Bandit" had a lot to do with it. The mad shipwrights have surpassed their earlier efforts (November 2005 and December 2009 issues) with this 50mph monsterpiece. It's a two-seater stuffed with a blown, intercooled, 260hp mill, along with GPS, an iPod dock, and a snorkel-mounted videocam linked to viewscreens in the cabin. Pricing for the Seabreacher X, limited to a school of just 10 fish, could swim past $90,000. Oh, and do *not* miss the video on the site. If you can't have a good time driving your own personal shark, well, you're no chum of ours. ▲

Panasonic HDC-SDT750

If 3D is going to have any kind of success in the living room, we would hope that home users will have a reasonable way to make their own 3D content. Panasonic (panasonic.net) could supply the missing link with the HDC-SDT750 camcorder, currently preselling at $1,399.95 online for October delivery, plus a couple of models already shipping in Japan (HDC-TM650 and HDC-TM750). Each of these SD memory card cams shoots 2D AVCHD video at 1080/60p and in 5-channel Dolby surround sound. Hook up the included VW-CLT1 lens attachment, however, and you'll record 3D video with two 960 x 1,080 frames side-by-side. You can enjoy the footage on your 3D TV through connections such as HDMI, archive it to AVCHD DVD or BD, and even edit it with the included HD Writer AE 2.6T 3D-compatible editing software. ▲

Pinel & Pinel Arcade 80's Trunk

Much of French artisan Fred Pinel's (www.pineletpinel.com) handbuilt output consists of boxes, leather, and leather-wrapped boxes. It only makes the odd multimedia novelty stand out the more. Peep this, a $17,200 steamer trunk straight outta the '80s, *a la* Rick(y) Schroder's "Silver Spoons" or Richard Pryor's "The Toy." Also available in crocodile skin, this game cabinet throws threescore arcade classics such as Pac-Man onto a 1080p screen. It's also an iPod dock with 110dB of thunder—and why not? Elsewhere, Pinel sells a Movie Trunk. This self-enclosed home theater on wheels comes with a Bang & Olufsen flatscreen, DVD player, and sound system. Hard to believe it's from the same firm that sells a dog collar/ladies' bracelet. ▲

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Nvidia 3D Vision Surround

Three Monitors, Three Dimensions & Big Bucks

3D seems to be the buzzword for 2010, thanks to "Avatar," 3D Blu-ray, and that huge push toward 3D-compatible TVs at this year's CES. But the hardware used to watch your favorite games and movies in 3D is by no means new. In fact, back in 1999, Elsa launched its Relevator glasses, which employed the same LCD shutter technology that Nvidia's 3D Vision product features today.

A key difference, however, is that 10 years ago we were using big, power-hungry CRT monitors. Now, it's all about the LCD, and we've only recently had access to LCDs capable of refreshing at 120Hz. Why the emphasis on 120Hz? You want around 60 frames per second, overall, in order to maintain a flicker-free viewing experience. With shutter glasses alternately blanking out your right and left eyes, it takes a 120Hz screen to deliver those 60 frames. Conventional 60Hz screens would only give you 30 frames in each eye.

Those 120Hz screens first emerged in concert with Nvidia's 3D Vision technology back in 2009. Since then, we've enjoyed playing a number of games in stereo.

3D Vision Surround represents something much more opulent: gaming across three displays, in stereo. With the advent of Nvidia's GeForce GTX 480, we now have a graphics processor with enough muscle to drive a 5,760 x 1,080 resolution (three 24-inch displays side by side) at playable speeds.

There's just one problem: The GeForce GTX 480 only comes equipped with two display outputs. So, driving three monitors means running a pair of 480s in SLI. That's probably for the best, though. After all, stereoscopic mode requires rendering each frame twice—once for each eye. The workload truly requires a couple of GeForce GTX 480s for performance that's good enough for today's DirectX 11 titles.

The parts you'll need to build a solid 3D Vision Surround setup are readily available, and if you want to push even more horsepower, you'll be happy to know that 3D Vision Surround works with up to three GeForce GTX 480s in parallel. So, we're left with two critical questions: How much will it cost, and is the stereoscopic experience worth what you pay?

Build A 3D Vision Surround Setup

As with the ATI Radeon HD 5870 Eyefinity 6 Edition, AMD's six-output card capable of driving a sextet of LCDs, 3D Vision Surround is aimed squarely at power users with plenty of cash. It requires a pair of graphics cards, a trio of 120Hz displays, and 3D glasses. We strongly suggest investing in a stand, too.

Now, the good news is that Nvidia isn't limiting this technology to its current-gen GeForce GTX 400 series boards. Owners of GeForce GTX 260/275/280/285/295 cards (in SLI, of course) can also enjoy 3D stereoscopic gaming. The recent GeForce 258.96 driver package enables 3D Vision Surround across both product families.

The bad news, however, is that it turns out that rendering a frame for each eye at

5,760 x 1,080 is a particularly demanding task. As a result, you can rule out reasonable performance from a pair of last-generation cards in modern games. If you're going to spend the money on 3D Vision Surround, you'll really want a couple of GeForce GTX 480s or 470s.

To those two or three pricey graphics cards, you'll need to attach a trio of 3D Vision-compatible displays. There are currently six LCDs capable of 1,920 x 1,080 and three that run at 1,680 x 1,050 on the list, along with 15 different qualifying projectors. The options are clearly limited, and to make matters worse, compatible LCDs bear an onerous price premium. For example, Acer's 23.6-inch GD235HZ, which has average output quality, costs $400. Multiply by three and you're looking at $1,200 for a 3D Surround configuration.

Of course, we can't forget that 3D Vision technology is dependent on LCD shutter glasses, which Nvidia sells for a cool $149 a set (after you've purchased the $199 3D Vision kit that includes an IR emitter and one pair of shades). At the very least, most gamers do their thing in solidarity, so it's unlikely you'll need to sink a large sum into the active shutter glasses for spectators.

The final line item isn't really mandatory, but it does come highly recommended: a stand. Lining up three displays side by side is difficult, and the desk space they consume is substantial. Mounting the trio to a single frame, such as Ergotech's Triple LCD Desk Stand ($360), alleviates alignment issues and minimizes the surface area monopolized by three displays.

No Such Thing As Perfect

Despite the technological similarities, stereoscopic gaming today is light years ahead of where it was a decade ago. The content is far more compelling, for starters. Advances in graphics processing hardware mitigate the performance penalty of rendering a unique frame for each eye, too. In fact, a pair of GeForce GTX 480s musters enough horsepower to drive many modern DX11-based titles in excess of 40 or 50 frames per second at native LCD resolutions. But 3D Vision Surround, for all of its extravagance, is not perfect.

Most obviously, it's incredibly expensive. A pair of GTX 480s, three monitors, a stand, and the glasses adds up to more than $2,500—and that's before building the rest of your gaming PC. Beyond sticker shock, the enjoyment of gaming in 3D stereo is largely subjective. Some folks can't see the depth effect at all, and others are bothered by it. If at all possible, find a friend with a 3D Vision setup and give it a try before dropping close to three large on your own.

In a more technical vein, there's a serious side effect of blanking out each eye 60 times per second: the perceived brightness of a 3D Vision Surround setup is markedly reduced. In games with bright environments, such as Just Cause 2, losing brightness isn't a problem. In darker titles, such as Left 4 Dead and Metro 2033, it's more distracting. Consider the brightness reduction a necessary evil for now; we've yet to be impressed by any of the other competing stereoscopic technologies.

It's Not All About Performance

When we talk about the merits of an expensive, high-end solution, its performance takes center stage nine times out of 10. With 3D Vision Surround, you only need enough performance to play at your desired resolution and quality settings. Anything in excess of 60fps is overkill, because that's where Nvidia's drivers cap speed.

More important than raw frame rate is 3D Vision's software compatibility story. Titles that have received a lot of attention from Nvidia's developer relations team, such as Battlefield: Bad Company 2 and Just Cause 2, look amazing. They're considered 3D Vision-Ready, and the experience translates flawlessly to three displays. Those that came out before 3D Vision's time, or weren't as influenced during development, are subject to artifacts, resulting in ratings that range from Excellent to Not Recommended, depending on the severity. You can check the relationship between 3D Vision Surround and your favorite titles at www.nvidia.com/object/3d-vision-3d-games.html.

For the most part, games behave well in stereo. A majority requires one or two specific features to be disabled, but getting a suitable output isn't particularly challenging, especially because Nvidia's driver tells you the best settings to use. It's a little troubling to see relatively new titles like DiRT 2 and Aliens vs. Predator completely unplayable, though Nvidia points to AMD's involvement in the development of those games as the cause. The good news is that Nvidia tells you up front on its compatibility site whether your favorite software works well, helping you to make an informed decision.

With all of that said, Far Cry 2, S.T.A.L.K.E.R., Battlefield: Bad Company 2, and Just Cause 2 all needed to run at 4,800 x 900 to stay above 40fps. Otherwise, our twin GeForce GTX 480s couldn't quite keep up. On the other hand, the tandem of 480s handled Call of Duty: Modern Warfare 2 at 5,760 x 1,080 just fine, ranging from 50 to 60fps.

The Future Of Gaming?

It'd be hard to give such an expensive technology an enthusiastic recommendation, especially with game compatibility varying on a case-by-case basis. Despite the issues it presents, though, 3D Vision Surround's wow factor rivals seeing a game like GLQuake rendered on a graphics accelerator for the first time. It's a game-changer, to be sure, and we hope to see it evolve further. ▲

by Paul Cross

Nvidia 3D Vision-Compatible 120Hz LCDs

1,920 x 1,080 Displays

- Acer GD235HQ
- Acer GD235HZ
- Alienware OptX AW2310
- Asus VG236
- LG W2363D
- LG W2363DB

1,680 x 1,050 Displays

- Samsung SyncMaster 233RZ
- ViewSonic FuHzion VX2265wm
- ViewSonic FuHzion VX2268wm

In Win Dragon Slayer

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Meet an mATX minitower in the vein of Frank Frazetta. This Dragon Slayer is just an airbrushed side-panel mural away from total awesomeness.

In Win says that the hexagonally perforated steel motif is meant to evoke chain mail. We see in it ye olde hex paper, much beloved among turn-based gaming nostalgists.

Breezy is the Dragon Slayer. Beyond its quartet of included fans, its perforated and filtered side panel has rubber mounting grommets for up to four more 120mm blowers. There's another paneled vent on the floor to accommodate your bottom-feeding power supply.

In Win pulls off a largely tool-less design here. The pin brackets for the drives have twist locks that are color-coordinated with the fan rotors, grommeted drive rails, and expansion card retainers. The consensus around the lab calls the hue matte neon yellow, if not chartreuse.

The front SuperSpeed USB 3.0 connector terminates in a long cable meant to loop out the back through a rubber-lined hole, thence to mate with an unattached and suitably fast female port, such as on the motherboard or a daughtercard. Two Hi-Speed USB ports and the usual HD/AC97 jacks round out the front gallery.

Slaying any dragon requires adaptability, and thus In Win allows you to repurpose the drive bays in a number of ways. Rest assured that if you need to mount an SSD or prefer to use multiple burners, you're covered. The hardware packet even includes several inconspicuous, peel-and-stick cable tamers.

Pardon our meme-dropping, but this In Win is full of, uh, win. ▲

Specs: Materials: Steel chassis, plastic and steel fascia; Motherboard support: microATX; Expansion slots: 5, 12.5 inches long; Bays (reconfigurable): 1 external 5.25-inch, 3 internal 3.5-inch, 1 external 3.5-inch, 1 internal 2.5-inch; Dimensions: 16.9 x 7.7 x 16.8 inches (HxWxD); Fans: 1 front intake 140mm, 1 front intake 80mm, 1 rear exhaust 92mm; 1 top exhaust 140mm

by Marty Sems

Sentey SS1-2422

Sentey SS1-2422
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Sentey
www.sentey.com

Sentey currently produces a series of sleek, space-saving chassis, and the classiest of them all might be the Sentey SS1-2422. The smartly compact interior configuration, LCD, and plastic bottom supports are a few of its useful features.

Though not necessarily geared toward the builder with a penchant for water-cooling and showy side panels, the SS1-2422 makes its presence known by its piano black and maroon exterior and interactive front panel. Occupying a third of the right-front panel, the blue-backlit LCD displays fan speed, speaker volume, internal temperature, HDD activity, and power usage. The Set button locks an internal temperature threshold and then ratchets the fan speed up to 100% if the internal temperature rises above that threshold; you can also set an alarm to beep when the internal temperature exceeds your established value.

The SS1-2422 comes equipped with a 450W power supply that's mounted on the anterior side of case, with the main power cable attached to the posterior AC connector. The interior is slightly cramped, but good cable organization is still very possible thanks to a few pockets of space throughout. Clearly, the case's narrow body is also its shortcoming: You'll have to use low-profile expansion cards and probably limit your cooling options, avoiding tall, tower-type CPU heatsinks.

On the other hand, the removable dual-tray bay, designed to house the optical drive and a 3.5-inch drive, is convenient, giving you easy access for installing drives. There's another 3.5-inch bay that could serve as an external or internal bay; simply leave the corresponding maroon plastic cover in place on the Sentey's front panel in the latter scenario. ▲

Specs: Case type: Slim tower; Materials: Steel, plastic; Motherboard compatibility: ITX, microATX; Bays: 1 5.25-inch external, 1 3.5-inch internal, 1 3.5-inch external/internal; Slots: 4 low-profile; Dimensions: 12.79 x 4.09 x 15.74 inches (HxWxD); Fans: 1 80mm top; Front ports: 2 USB 2.0, mic in, headphone; 450W PSU

by Joanna Safford

"By integrating an Xbox 360, the Big O offers everything and the kitchen sink."

– CPU Magazine

THE BIG O

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Logisys 2.4GHz Wireless 800/1600 DPI Switchable Mouse

Spend just five minutes with the Switchable Mouse, and it's apparent that Logisys didn't set out to do anything too fancy with this input device except give users an attractive, affordable option that will work as easily with a notebook as with a desktop PC. My guess is, however, you'll be more inclined to permanently match the mouse with your notebook. Overall, the rodent's diminutive size lends itself far better as an option during those times when the prospect of using a touchpad for long periods just isn't that appealing.

Picture a baseball that's been cut in half and you have a good idea about the Switchable Mouse's size and shape. Its light weight makes it a great fit for a notebook bag, but the mouse got lost in my largish hand when I used it for long stretches with a desktop PC.

The mouse is a looker, though. My test unit was decked out in silver and white trimmings complete with reflective chrome covering the backside. Models are also available in black/silver, green/white, and red/black.

Elsewhere, you'll find padded, ridged grooves cutting into either side for the thumb and pinky to rest. The mouse's bottom, meanwhile, sports an appreciated on/off switch to save battery power (one AA required), as well as a slot inside the battery compartment to store the tiny, nickel-sized nano RF transceiver that makes wireless use possible.

A couple features worth noting include a button on top to switch between 800dpi and 1,600dpi. I preferred the 1,600dpi option in all my usage. Elsewhere, although the scroll wheel lacks horizontal scrolling, you can move between a Hyper-Fast mode for scrolling long documents and Web pages and a Click-to-Click mode when you need more precision.

If you desire more beyond this, you'll need to look elsewhere, as what you're getting here is a basic mouse that's ready to use immediately upon plugging in the transceiver. ▲

by Blaine Flamig

Specs: 2.4GHz wireless; optical tracking; 800 or 1,600dpi; Hyper-Fast and Click-to-Click scrolling; On/Off switch; low-power LED indicator

2.4GHz Wireless 800/1600 DPI Switchable Mouse
$20
Logisys
www.logisyscomputer.com

Asus ENGTX460 DirectCU TOP

The GeForce GTX 460 from Asus came in too late to make it into last month's roundup, but we couldn't pass up the opportunity to get a closer look once we saw the angular heatsink shroud painted blue with white pinstripes, evoking the iconic Shelby Cobra.

Under the hood, Asus overclocked the GF104's core clock to 775MHz, which is a full 100MHz higher than the stock clock of the 1GB GTX 460. The memory clock also got a boost from 1,800MHz to 2,000MHz. The shroud covers a substantial aluminum finned heatsink with three heatpipes, and as we hinted above, it's one of the more attractive we've seen. However, because of its open design, some of the heat this card generates ends up circulating throughout the case. But because the GTX 460 is the twice removed second nephew to the silicon-boiling big daddy that is the GF100 Fermi, heat is not an issue you need to worry too much about. The backplane of this dual-slot card features a pair of DVI ports and a mini HDMI port. Bundled extras include a 4- to 6-pin PCI-E power connector, a DVI-to-VGA adapter, a DVI-to-HDMI adapter, and a CD wallet.

ENGTX460 DirectCU TOP
$239
Asus
usa.asus.com
●●●●

Benchmark Numbers	Stock GeForce GTX 460	Asus ENGTX460 DirectCU TOP
3DMark Vantage Extreme	Extreme (1,920 x 1,200)	
Overall	X6600	X7590
GPU Score	6337	7299
GPU1	20.06	23
GPU2	17.02	19.71
CPU Score	31307	31188
CPU1 (Plans/s)	4361.03	4356.75
CPU2 (Steps/s)	40.77	40.31
	1,920 x 1,200	
Left 4 Dead (8XAA, 16XAF)	79.31	89.6
Far Cry 2 (8XAA)	57.65	64.54
Dirt 2 (8XAA)	36.6	46.7
S.T.A.L.K.E.R.: CoP (4XAA)	20.8	23.8

Asus' overclocked GTX 460 managed to score 5fps better than the stock GTX 460 in 3DMark's game tests, but Dirt 2 ran consistently 10fps faster on the Asus card. Although S.T.A.L.K.E.R.: Call Of Pripyat showed just a 3fps bump at 1,920 x 1,200, this card is one of the faster GTX 460s we've seen, and the $10 premium feels like a steal. ▲

by Andrew Leibman

Specs: GPU: GF104; Core clock: 775MHz; Memory: 1GB GDDR5 (2,000MHz); 336 CUDA Cores, 56 texture units, 32 ROPs

Test system specs: CPU: 3.33GHz Intel Core i7-980X; Motherboard: MSI Big Bang XPower; RAM: 6GB Crucial DDR3-1600; Hard drive: 128GB Patriot Zephyr SSD; Topower 1100-W PSU

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Intel Core i7-970

Until very recently, if you wanted a six-core Intel desktop processor, you had only one speed bin and model to choose from: the pricey 3.33GHz Core i7-980X Extreme Edition. However, in the past couple of months, Intel decided to introduce a slightly more affordable six-core chip, the Core i7-970.

This new hexa-core beast, like the 980X, is built on Intel's new 32nm process and clocks in not so far behind at 3.2GHz. Its top Turbo Boost speed is 3.46GHz, compared to the 980X's 3.6GHz, and its QPI link speed is set to 4.8GTps vs. 6.4GTps for the 980X, the latter of which won't hamper performance much, if at all. The 970 also has 12MB of shared L3 cache, just like its more expensive six-core sibling. Built with Intel Hyper-Threading technology, the chip is able to offer 12 threads of processing resources to the OS.

Also like the previous Core i7 six-core release, this chip will drop into existing Socket LGA1366 motherboards, though you might need to grab the latest BIOS update to support the new chip microcode. From a performance standpoint, for single- or lightly threaded workloads, the Core i7-970 lines up slightly behind a quad-core Core i7-975. However, in multithreaded applications that make use of the chip's extra cores, the Core i7-970 is up to 50% faster than its nearest quad-core counterpart and within about 5 to 7% of the 980X.

The Core i7-970 doesn't carry such an extreme price, retailing around $885, making it a great "budget" chip if you want six cores of Intel processing power. ▲

by Dave Altavilla

Core i7-970
$885
Intel
www.intel.com
●●●◖

Specs: 3.2GHz core clock (3.46GHz Turbo); 12MB L3 cache; Socket LGA1366, 130W TDP

Test system specs: 3.2GHz Core i7-970; 6GB DDR3-1333; 150GB WD Raptor HD; Nvidia GeForce GTX 280; Gigabyte EX58-Extreme; Windows 7 Ultimate 64-bit

Benchmark Results	Intel Core i7-970
SiSoft Sandra 2010	
Processor Arithmetic	
CPU Dhrystone (GIPS)	146.2
CPU Whetstone (GFLOPS)	105
Processor Multi-Media	
Multimedia Integer (Mpixels/s)	273.6
Multimedia Float (Mpixels/s)	203.61
Memory Bandwidth	
Integer Buffered iSSE2 (GBps)	22.35
Floating Point-Buffered iSSE2 (GBps)	22.37
PCMark Vantage	
Overall	10257
Memories	7426
TV & Movies	6060
Gaming	11001
Music	7964
Communications	12660
Productivity	8481
3DMark Vantage	
CPU2 (fps)	38.3
Cinebench 11.5*	8.71
POV-Ray 3.7**	
Multi-Threaded	6135.04pps
ET Quake Wars (low quality)	189.7
Crysis (low quality)	218

*points **pixels per second
Games tested at 800 x 600.

Western Digital TV Live Plus

We became fans of Western Digital's second-generation TV Live shortly after its Fall 2009 launch. It wouldn't play DRM content from Amazon Unbox or the iTunes Store, but it handled pretty much every video and audio file format in our collection. A tiny remote, Ethernet port, HDMI 1.3, 1080p, S/PDIF, component, and composite support clinched the deal. The 10-foot UI was functional but Spartan. We liked the support for media services, such as Flickr, YouTube, and Pandora (with varying degrees of functionality), but found the lack of Hulu and Netflix to be obvious omissions.

WD's new TV Live Plus model keeps everything we loved about the original. It also has no storage, but it features two USB 2.0 ports for USB flash or hard drives with stored media. You can stream content directly across your network if you choose not to use additional storage. We recommend an 802.11n or wired connection for streaming HD video.

Netflix streaming is the major new feature on TV Live Plus. However, you can also manage your Instant Queue without logging into a computer. The other big feature gives you the ability to navigate DVD menus on ISO images of DVDs. That means you can mount an ISO image of a DVD and use it like a physical disc. Firsthand experience dictates that moving all your physical DVD media from the TV room into the garage will please your significant other, create space, and provide instant access to your film library.

Overall, TV Live Plus is an incremental improvement over the prior, already decent model. The quiet and very small hardware plays everything we care about with ease, and it's reasonably priced. We'd like to see USB 3.0 support, a backlit remote, bundled 802.11n, Hulu support, and a prettier UI in the next iteration, please. ▲

by William Van Winkle

TV Live Plus
$149.99
Western Digital
wdc.com
●●●●◖

Specs: Ports: 2 USB 2.0, HDMI, S/PDIF, component, composite A/V, Ethernet; remote

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

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i7	(8MB L3 Cache, 1066Mhz)	
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Corsair Hydro Series H70

Corsair's Hydro Series H50 has been popular for those looking to test the liquid-cooled waters, so to speak. Its prefilled, closed-loop configuration, good performance, ease of installation, and affordable price appealed to a broad swath of users. With the new Hydro Series H70, Corsair aims to improve upon the H50 in a few key areas while maintaining the appealing aspects of the original.

Like the H50, the H70 is a prefilled, closed-loop liquid-cooler, compatible with Intel's and AMD's modern desktop processor sockets. The H70, however, features a thicker radiator with more surface area than the H50, dual fans arranged in a push-pull configuration, and an improved copper cold plate/pump assembly. The end result is a cooler that's as easy to install as the H50, but with a superior ability to dissipate heat.

The H70 includes similar mounting plates, so the installation process is about the same as the H50's. The radiator and fan assembly attach to an available rear 120mm fan mount. And after installing the necessary retention plate for the particular socket, the cold plate/pump assembly is screwed down securely.

I tested the Corsair H70 (with its fans running at full speed) with a Core i7-975 at stock and overclocked (4GHz) speeds. The H70 decimated the i7-975's stock cooler.

The Corsair Hydro Series H70 is a top-notch kit in almost every way, but the improvements over the H50 come at a price. The H70 will sell for about $110, putting a bigger dent in your budget than the H50. Still, we suspect enthusiasts who opt for the H70 will ultimately be pleased by its performance. ▲

by Marco Chiappetta

Specs: Socket compatibility: LGA775/1156/1366, AM2/AM3; Materials: Cold plate: copper, Radiator: aluminum; Fans: 2 120mm

Hydro Series H70
$109.99
Corsair
www.corsair.com

Benchmark Results*	Corsair H70	Intel Core i7-975 Stock Cooler
Stock (idle/load)	35/51	40/67
Overclocked (idle/load)	37/59	42/88

*All temperatures in degrees Celsius.

Test system specs: CPU: Intel Core i7-975, Motherboard: Gigabyte EX58-UD5, RAM: 6GB OCZ DDR3-1333, GPU: GeForce GTX 280, Storage: WD Raptor 150GB, Win7 Ultimate x64

NZXT Phantom

The NZXT Phantom is a full-tower design that will be available in white, black, or red. Also note that the chosen color covers both the exterior and interior of the case. The Phantom has what I'd call an angular design: The front panel has a triangular protrusion at the bottom, with smoother curves up top. The case panels are littered with angular cutouts and metal-mesh perforations.

At the top of the Phantom, users will find a typical assortment of connectors, along with an excellent five-channel fan controller. The front of the Phantom has a hinged door that hides five 5.25-inch bays, and the back has all of the common elements of a full tower, in addition to a switch that gives users the ability to toggle any case lighting on and off. The Phantom includes an array of fans ranging in size from 120 to 200mm. Even with the fans running at their top speeds, the case remains relatively quiet.

Because of its size and nearly tool-less design, working within the Phantom is a breeze. All drives, with the exception of 2.5-inch SSDs, which require a few screws, can be mounted using tool-less retention mechanisms or trays. Large graphics cards will fit in the Phantom easily, as will tall, tower-type CPU coolers (provided the optional 200mm side-panel fan isn't installed).

Overall, I really like the Phantom. Its aesthetics may not have universal appeal, but for the money, this case is tough to beat. ▲

by Marco Chiappetta

Specs: Motherboard compatibility: E-ATX, ATX, microATX, Baby AT; Materials: Plastic, steel; Dimensions: 21.3 x 8.7 x 24.5 inches (HxWxD); Fans: 1 140mm front, 1 120mm rear, 2 120mm side, 1 200mm top (LED); Fan mounts: 1 200/230mm side, 1 200mm top; Bays: 5 5.25-inch external, 7 3.5-/2.5-inch internal; Slots: 7; Weight: 24.2 lbs

Phantom
$139
NZXT
www.nzxt.com

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CIRCULAR Type

BLADES Detachable

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ECOMASTER

Lian Li PC-T60

Conventional enclosures can make working with components tougher, and unless we're talking about something wildly modded, it's hard for a case to make an impression these days.

Enter Lian-Li's DIY Test Bench series. These are open-air chassis built to hold common form factor components in a way that's efficient, accessible, and eye-catching. Lian-Li's T60 for ATX and microATX boards may not have the sizzle of Antec's Skeleton, but it does have its advantages, starting with color availability in silver, black, and red. The red model costs $30 extra, but you do get black standoff screws, whereas the silver model comes with silver standoffs. (We would have preferred a pads-and-pegs approach to make board swapping easier.)

Lian-Li uses rubber grommets for the drives and power supply, but the chief flaw here is an odd lack of tool-less design. With modern towers, we're used to clipping on a couple of rails on drives and zipping them in and out of bays. That's what you want on a "test bed." Not here. The T60 requires everything to be screwed down when spring-loaded pegs might have served equally well in many spots. Also, the balance of the T60 is fine if you have a relatively short CPU cooler. A large heatsink plus the tug of cables can tip the chassis back, causing you to shift the motherboard tray forward. But this will put the cooler right under the handle; if the cooler is too tall, the handle will have to come off.

We also missed any sort of integrated cable management. Another idea behind a good test bench is to minimize footprint and improve tidiness. So where are the clips, ties, and/or routing tunnels to help with that? Although the T60's build quality is up to Lian-Li's habitual excellence, designers seem to have forgotten how the chassis would be used in the real world. ▲

Specs: Material: Aluminum; Motherboard compatibility: ATX, microATX; Bays: 3 3.5-inch, 2 2.5-inch, 2 5.25-inch; 2 x optional 120/140 mm case fans; Slots: 8; I/O ports: 2 USB 3.0, 1 eSATA, HD+AC97 audio; Dimensions: 15.75 x 13.82 x 12.99 inches (HxWxD)

by William Van Winkle

PC-T60
$99.99
Lian-Li
www.lian-li.com

Viewsonic VG2428wm

Currently available for about $270 online, the VG2428wm is a screaming deal if you want a top-end, 24-inch LCD but not the top-shelf price tag that's often attached to such displays. The VG2428wm supports VGA and DVI-D ports but not HDMI. Instead, you get a two-port USB 2.0 hub and a 3.5mm stereo that feeds the 2W integrated stereo speakers. The speakers are sufficient for voice and YouTube, but you wouldn't want to game with them.

Using X-Rite's i1Display2 package, we measured the VG2428wm out of the box with a 2.2 gamma, an already optimal 6500K color temperature, a minimum luminance of 0.3cd/m^2, and a running luminance (at 100%) brightness of 329cd/m^2—a respectable 10% above the vendor's specification. We observed only slight blooming around the bottom edge and nothing out of the ordinary for a mainstream CCFL unit.

We've heard from Viewsonic that the company is transitioning to LED backlighting across its product line, and we can see why. Despite excellent color quality (that admittedly favors reds a bit over blues before calibration), deep blacks, zero visible ghosting, and excellent ability to preserve bright color grades without banding, the only weakness in this model is its power consumption. With a solid black background on the Windows 7 desktop, we measured the VG2428wm drawing 38.4W. A solid white background yielded 37.3W. With the default Win7 desktop, we measured 37.9W at 100% brightness, 27W at 80%, and 22.5W at 50%, with full-screen video maxing out at 41.2W. LED panels generally consume much less.

However, Viewsonic's stand is brilliant, allowing for a 90-degree pivot, 360-degree swiveling, almost effortless tilting from -5 to 20 degrees, and a height adjustment spanning 5.3 inches, so you can be ergonomically comfortable. The 0.75-inch bezel isn't remarkably thin, but it's svelte enough to escape much notice. Overall, the VG2428wm is one of the best monitor values we've tested recently. ▲

Specs: Size: 24-inch widescreen (23.6-inch viewable display area); Brightness: 300cd/m^2; Contrast: 1,000:1 (static), 100,000:1 (dynamic); Viewing angles: 170 (H), 160 (V); Response time: 5ms (typical); Warranty: Three-year limited

by William Van Winkle

VG2428wm
$369
Viewsonic
www.viewsonic.com
●●●●

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Solid-State Storage 101

SSD Tips, Tricks & Tweaks

Solid-state drives are a hot commodity with enthusiasts these days. Although SSDs are still exponentially more expensive on a cost-per-gigabyte basis than traditional spinning platter-based hard drives, competition in the segment has put the drives within reach of many more power users than was the case even just a few months ago. It is now possible to score an inexpensive SSD to use as a boot volume for well under $100. When paired with an inexpensive, standard hard drive, SSD users can have the best of both worlds—ultra-low access times and speedy transfer times from the solid-state volume and cheap bulk storage from the HDD. A fast SSD and high-capacity hard drive have become the preferred storage configuration for a large percentage of power users.

The relative affordability of current-gen SSDs is a definite boon to performance-conscious users. It has been said many times before, but it bears repeating here: Moving to solid-state storage is arguably the most effective and perceptible upgrade one could perform to a system. And although simply installing and using an SSD will result in increased performance under most circumstances, there are still a multitude of system modifications and tweaks you can perform to further enhance the performance and longevity of an SSD.

Right out of the box, modern solid-state drives like this OCZ Vertex 2 offer significant performance benefits over traditional hard drives. However, as is usually the case with a relatively new technology, there are almost always modifications and tweaks that can be performed to maximize performance and reliability.

Primped, Primed & Ready

A handful of SSD optimizations should be performed before an operating system is installed or a single file is even copied to the drive. In particular, we recommend completing the following tasks before actually using your new SSD: update its firmware, secure-erase it, set the motherboard's SATA ports to use AHCI (Advanced Host Controller Interface), and create any partitions using an SSD-aware tool, such as the one built into Windows 7.

Updating the drive's firmware is self-explanatory. New SSD firmware typically introduces additional features (such as TRIM or garbage collection) or enhance performance, so it's almost always worth updating. Keep in mind, though, that some firmware updates are destructive and will wipe all data from the drive, which is why new SSD owners should check for firmware updates immediately.

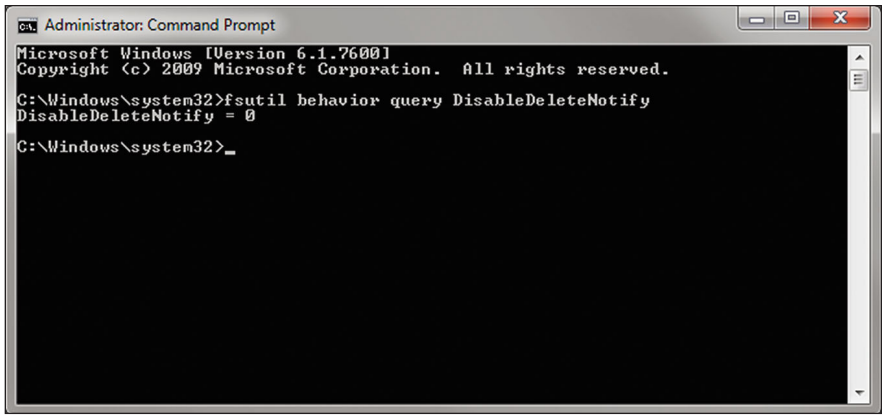
Some will argue that secure-erasing an SSD before using it is unnecessary, and, for the most part, they'd be correct. But we've encountered more than one SSD that exhibited strange behavior and performance fresh out of the box, and secure-erasing them resolved the issues. So take a minute and secure-erase the drive using a tool like HDD Erase before installing

anything to the drive. We explained how to use HDD Erase in "Advanced Q&A Corner" a few months back. (See page 40 in the May 2010 issue.)

We also recommend using AHCI mode with any modern SSD because legacy ATA specifications don't have accommodations for several new features, including TRIM. Some SSDs have controllers that won't benefit from using AHCI, but the latest drives that use Marvell or SandForce controllers will, and their performance will be increased as a result. To use AHCI, you'll have to enable it in the motherboard's system BIOS before installing the OS. AHCI is also necessary for TRIM to function; you should definitely be using AHCI to maintain peak performance if your drive has TRIM support.

Finally, when setting up the drive for the first time, use an SSD-aware partition utility that will align the drive properly. Older partition tools from the pre-Vista era will likely create the first partition on an SSD at sector 63, which is usually in the middle of an SSD page. A misaligned SSD could degrade performance significantly and cause OS stuttering problems due to increased read-modify-write operations being performed. Proper SSD alignment requires that the first partition start at sector 128. The partition tool built into Win7 (or the latest versions of GParted) will create a partition on an SSD properly, so use the newer tools to ensure the drive is configured properly.

The final pre-OS installation tweak is manual overprovisioning, but before we dig into this technique, the procedure requires a bit of explanation. It is sometimes mistakenly called "short stroking" an SSD. Basically, manual overprovisioning means leaving a portion of flash memory blank, without any partition information, for the drive's controller to reclaim as space for wear leveling, garbage collection, etc. Although SSD manufacturers often do this to an extent already, giving more space to the controller allows the drives to potentially recover from dirty state more rapidly and makes more blocks available for bad-block replacements.



The TRIM command lets an operating system send instructions to a solid-state drive to recover and erase blocks that are no longer in use due to a file being deleted, moved, modified, etc. But TRIM will only function under certain configurations, and it isn't always enabled by default. To enable TRIM support, you must also enable AHCI, install the proper AHCI drivers, and enable TRIM within the OS.

Manual overprovisioning is as easy as creating a partition size that is smaller than the total volume of your SSD. For example, if you have a 120GB SSD, create a partition of 110GB and let the drive's controller reclaim the spare 10GB. We acknowledge that storage space is a limited commodity with SSDs, but if you can afford to overprovision some space, the drive will usually recover from dirty states faster and theoretically have a longer life span.

Performance Optimizations

Once the initial setup of your SSD is complete and Win7 is installed, there are a number of other steps you should take to wring out some additional performance. As we mentioned earlier, enabling AHCI is important. But it is equally important to use the right AHCI drivers to ensure TRIM is functional. The drivers included with Win7 are usually all that is necessary, depending on your motherboard's southbridge or the SATA controller being used, but the latest Intel Rapid Storage Technology drivers support TRIM, too. This is an area that is in a constant state of flux, however, as newer drivers are released, so check your chipset manufacturer's Web site for the latest with regard to AHCI drivers.

Even with the proper drivers installed, it may be necessary to manually enable TRIM from within Windows. To check that TRIM is functional, open a command prompt with Administrator privileges. At the prompt, type **fsutil behavior query DisableDeleteNotify** and press ENTER. The result "DisableDeleteNotify = 0" means that TRIM is already functional. If the result is "1," then you need

Manual overprovisioning is as easy as creating a partition size that is smaller than the total volume of your SSD.

to manually enable TRIM from the prompt. Type **fsutil behavior set DisableDeleteNotify 0** and press ENTER.

If AHCI is enabled and the system's AHCI drivers are TRIM-capable (and the SSD has TRIM support, of course), the feature should be enabled after entering the aforementioned string. If TRIM does not work after making the change, however, it's likely due to a driver or firmware problem. Look to update the drivers and firmware where possible.

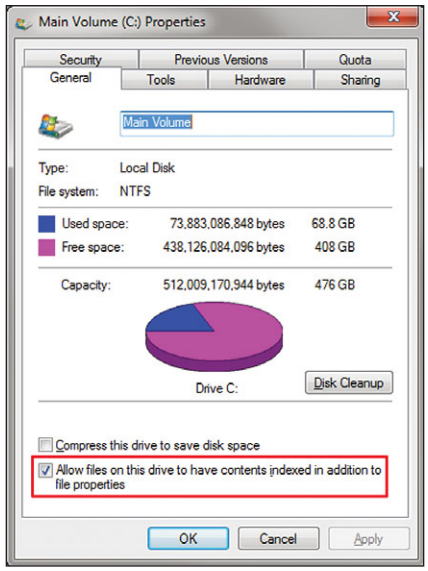
Another worthwhile SSD performance tweak is to disable Windows' indexing on the drive. By default, drive indexing is enabled within Windows to speed searches, but SSDs have such low access times that indexing is largely useless. Indexing also makes many small writes to the drive to modify index results, which is detrimental to the longevity of the drive.

Disabling indexing is quite easy, thankfully. Simply click the Start Orb, go to Computer, right-click the SSD, and choose Properties from the menu. On the General Tab, remove the check mark from the box labeled "Allow Files On This Drive To Have Contents Indexed In Addition To File Properties." Disabling index on a drive full of files can take a few minutes, but it's worth the wait when using an SSD.

A couple of other quick SSD performance-related tweaks have to do with virtual memory, namely the page file and ReadyBoost. SSD users should always set the size of the page file manually (use the recommended value on the virtual memory settings page) and keep it on the SSD. Also, don't use ReadyBoost. ReadyBoost is a feature within Windows that essentially uses a USB flash drive as a page file mirror, but there's no USB flash drive fast enough to match the speed of a SATA SSD.

Maximize Longevity

The fact that the NAND flash memory used in today's SSDs can only handle a finite number of writes before failing is well known. To help minimize this limitation, and also account for the inevitable bad blocks in some NAND flash memory chips, SSD manufacturers typically provision additional memory for wear leveling, garbage collection, bad block replacement, etc. The practice is known as overprovisioning, which is what we did earlier while prepping our SSD. Some SSDs sold as 100GB drives, for example, actually have 128GB of flash memory; the additional 28GB is the overprovisioned area. Having this overprovisioned memory is not only one of the ways manufacturers extend the life of their drives, but also a method to maintain peak performance during TRIM and garbage collection operations.



By default, Windows enables indexing on all drives to speed searching. A side effect of this indexing results in many small writes to the drive when modifying results. Solid-state drives have such low access times, however, that the indexing service is rendered effectively useless. So, disable the indexing service to minimize drive activity and writes.

With that in mind, taking steps to minimize writes to an SSD is a good idea. As such, the next mod we'll mention will help.

Windows maintains a number of different logs and updates them constantly whenever the OS and a given service(s) are running. Unfortunately, all of the updates make tiny writes to the drive, which is a no-no with an SSD. Moving the logs to a different drive, preferably the HDD you're using for bulk storage, is somewhat tedious but very straightforward.

First, create a new folder on the hard drive and name it whatever you'd like. Then navigate to the C:\Windows\System32\winevt\Logs folder, highlight all of your log files, and drag them over to the new folder. Then, click the Start Orb, type **event viewer** into the Search field, and press ENTER, assuming you're using Win7. (Event Viewer is available under Administrative Tools with other versions of Windows.) When Event Viewer opens, expand Windows Logs and select the Application and Event logs to see a list of all of the log files being maintained on the system. Right-click each of the logs under Windows Logos, select Properties, and, in the Log Path field, update the path with the info for the new folder that you created. Please note, the filename of the log must also be in the path, or the change will not take effect.

Solid State In A Solid State

There are reasons SSDs have become so popular with power users, namely performance and reliability. And it is well within the power of savvy enthusiasts to adjust both of these aspects of their SSDs. This starter article should help you clear some of the more common hurdles, but there are dozens, if not hundreds, of other SSD-related mods out there worth exploring. Happy tweaking! ▲

by Marco Chiappetta

Some SSDs sold as 100GB drives, for example, actually have 128GB of flash memory; the additional 28GB is the overprovisioned area.

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Bench Racer

As we've mentioned on several occasions in CPU, there is an incredibly robust LAN community in the Pacific Northwest, and it contains a large number of dedicated, skillful modders. One of the factors that helps make modding such a big deal in the area is the presence and support of Danger Den, a company of PC enthusiasts that started out just wanting better gear for their own rigs and ended up turning that passion into a highly successful business.

The quality of Danger Den's products and the impressive amount of work they do in the local community haven't gone unnoticed; massive, world-class PC component manufacturer Asus is a fan of Danger Den's people and products. The dialogue between the companies recently led to a unique collaboration.

Asus' Republic of Gamers brand of motherboards and graphics cards probably needs no introduction at this point. RoG stuff started showing up in 2006 and has been a fixture among gamers who build and upgrade their PCs ever since. The newest motherboard to bear the RoG name, the Rampage III Extreme, is a full-tilt gamer's and overclocker's board: Its standard configuration provides everything you could ask for except 4-way SLI. Asus decided to balance the desire some RoG customers had for full 64-lane PCI-E 2.0 support with affordability concerns and came up with a unique solution: the RoG Xpander.

The Xpander is essentially a daughtercard for the RIII Extreme with four PCI-E slots and two NF200 chips that gives the board full 4-way SLI support. The trade-off is that an Xpander-enabled RIII Extreme won't fit in a standard case. Asus was looking for a cool way to showcase the board and the Xpander, talked to the guys at Danger Den, and the Bench Racer was born.

Bench Racer consists of a Danger Den Black Series LDR Tower 29, the Asus RIII Extreme with Xpander option, four Asus GeForce GTX 480s, an Intel Core i7-980X Extreme Edition, Antec's TPQ-1200 six-rail 1,200W power supply, a 100GB Inferno SSD and a Sector 7 Edition 6GB 1800MHz Enhanced Latency DDR3 kit from Patriot, and custom watercooling from Danger Den, including dual radiators, reservoirs, and pumps plus waterblocks and fittings for the board and graphics cards.

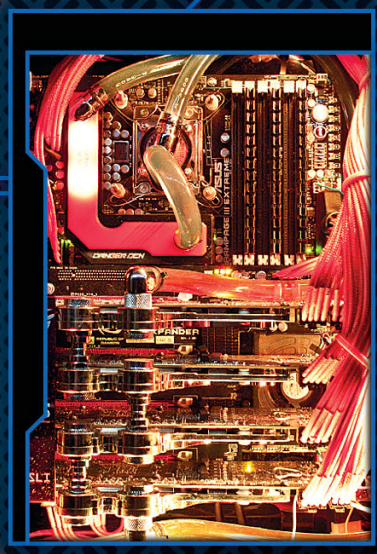
Danger Den's Dennis Leach says that Bench Racer is the result of a conversation he had with Brian Jang of Asus prior to the rush of activity that leads into PDXLAN. Jang had arranged for a custom Danger Den case to show off the RIII Extreme, and Leach asked him if Asus planned on including the Xpander.

"Brian told me that it wasn't really meant to be put in a case," Leach says. "It was for bench racing." He told Jang that Danger Den's cases are totally customizable and that they'd love to build a case to fit the Xpander, and when Jang asked if Danger Den could have it done in time for the LAN, Leach said yes, eager to meet the challenge. When he hung up the phone, Leach says, he wondered briefly if he'd bitten off more than Danger Den could chew.

"All I could think was, 'You just shot yourself in the foot,'" he says.

We're not sure how Leach's feet are at this point, but as you can see, the Danger Den Black Series LDR Tower 29 with Xpander Option turned out pretty well, and in addition to wowing the crowd at PDX, also recently graced the floor at QuakeCon.

"The few days I had to build it were a blur, but it was really fun working with all the different vendors and making this awesome machine a reality," Leach says. ▲



Modders-Inc.com Mad Reader MOD-Off

Four Men Enter, One Man Leaves

If you're into modding, chances are pretty good that you're familiar with Modders-Inc.com. The site is an invaluable resource for everyone from beginners to seasoned modders, and it's packed with how-to articles, worklogs, and modding-related product info. The guys behind the site and the podcast are skilled modders themselves, and we've been fans for years. In fact, several of the "Mad Reader Mod"-winning systems over the years have come from Modders-Inc.com staffers.

Tony Day's Green Flame mod. "I am sure Vic is gunning for me from the start, as usual," Day says. "That's OK, though, I know where he lives and I can be there in about 12 hours."

Now the guys have decided to put their skills to the test in a contest that will provide the winner with Modders-Inc.com bragging rights while proving that you don't have to have a fully equipped machine shop and thousands of dollars to create a good-looking mod. Thus, we are happy to present the Modders-Inc.com Hot Rod Mod-Off, sponsored by Thermaltake, Asus, Crucial, OCZ, and Mad Catz.

The rules are simple: Each of the four Modders-Inc staffers started off with the same canvas, Thermaltake's Element S, and will have to do all work on the mod themselves—no outside help with paint, metalwork, graphics, custom created parts, and so on is allowed. All work must be done using basic tools that most people have at home, such as power drills, sanders, saws, pliers, and so on. As the name of the contest implies, any sort of vehicle may provide the inspiration for the Hot Rod mods.

When the mods are done, the guys will install components from the contest's sponsors and will show them off both at Modders-Inc.com and here in the pages of *CPU*. A panel of judges (Brian "Boddaker" Carter, Bill "Overkill Bill" Owen, Ton "TiTON" Khowdee, and *CPU* editor Chris Trumble) will pick the winning mod. Check back next month for more on the Mod-Off, but for now, we thought we'd help you get to know a little more about the Modders-Inc contestants.

Dewayne "Americanfreak" Carel

Dewayne has been modding for about 10 years, and his favorite mod is always the one he's currently working or has just completed. He tries to do something new and different with each mod to help him learn new techniques. He doesn't have a favorite modder or mod outside of his own work; he enjoys the variety of mods he sees posted at his site and at LAN events all over the country and says that every modder has his own style that makes them great. He admits, however, that he admires Bill Owen of MNPCTech.com for building his passion into a business, which most modders would probably love to do.

He advises anyone just getting started in modding not to get discouraged if things don't turn out right the first time (or the second time). "One of my favorite quotes is, 'I haven't failed, I've found 1,000 ways that don't work,'" he says.

Carel is aware of the talent he is up against, and he replied that he knew he'd have to turn up the heat a bit. "This case mod will have the most painted graphics I have done so far, so I will have to make sure that it's perfect," he said.

Craig "Tech-Daddy" Tate

If you've ever listened to the Modders-Inc.com podcast, you've probably heard the deep, "radio guy" voice of Craig Tate. Tate is a frequent sight at LAN events in the Dallas, Tex. area and an accomplished modder. He began experimenting with mods in 2002 or so and has a flair for hot rod-themed case mods that should serve him well in this contest. In fact, Tate's inspiration for this contest comes from the Ford GT-40. "It's an amazing vehicle. I'm going to try and use some of the body's style elements to influence this build," he says.

Tate especially enjoys working with LED lights, due to their flexibility and size. "They consume very little electricity, create little to no heat, and you can build

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them on their own or get as complicated as you want utilizing controller boards and programming," Tate says. "They are just a perfect tool to be used in modding."

Tate's best advice to aspiring modders: "Patience is key. If you mod fast, chances are you will not like the results. Also, start with attainable goals; modding is about a series of little victories along the way, so don't make your mod so complicated that it defeats you and leaves a foul taste in your mouth toward modding."

Tony "Tazz" Day

Day has been modding for nearly six years now and says he's enjoyed each and every project. "I must say, though, that Green Flame is by far my favorite mod, which is probably why I still own it," he says.

Day says it's tough to pick a modder or a particular mod that he thinks of as his favorite, as there are so many great ones to choose from, but says one of his favorites was definitely Defyant's HP Resurrection II mod (you can see Defyant's first HP Resurrection mod on the cover of the January 2007 issue of *CPU*).

"Give up World of Warcraft and come back to modding, buddy, we all miss you," says Day.

Day has some ideas for his Hot Rod Mod-Off build: "After seeing that Thermaltake supplied us with Spin-Q CPU coolers, I realized that I already had one on hand and started thinking about how I could incorporate both of them into the mod," he says. Day originally thought about using them as mufflers (exhaust fans) or sticking them on the hood as air cleaners (again, in an exhaust role), but realized he'd be making less efficient use of them than they are designed for, so he went back to the drawing board. "I'm still thinking about this setup, we'll just have to wait and see how I implement them."

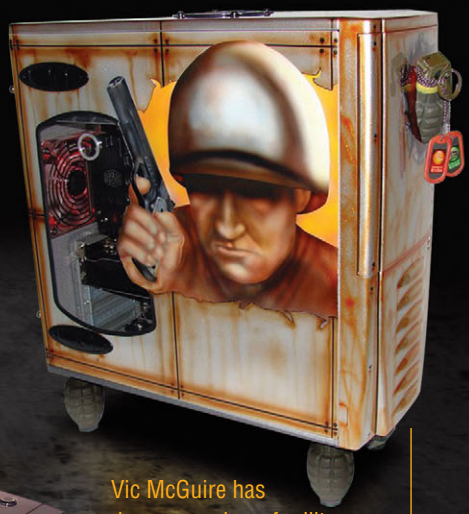
Vic "XcaliburFX" McGuire

Vic McGuire's modding career began about five years ago when he created a Tinkerbell-themed mod for his daughter. His mods frequently draw on themes related to family and friends for inspiration, including one of his favorite recent projects, his Call of Duty mod.

"It's somewhat of a small tribute to my son, who is currently in Afghanistan, and the many other soldiers who serve their country daily," McGuire says.

Vic's favorite aspect of modding is the paint process. "I really enjoy making rattle-can paint—well, any type of paint, actually—do things it wasn't meant to do," he says. "When things work out right, I can turn out some unusual effects, with great results."

McGuire knows he's up against some tough competition, but says his process will largely stay the same, although he'll push himself to share more of what he does in his worklogs. "Being a car nut, my goals are to build a Hot Rod mod that I will enjoy looking at and using and to win Best in Show at the end of the Mod-Off," McGuire says. ▲



Vic McGuire has done a number of military-themed mods, including this one, inspired by Call of Duty. "Me, talk smack? I am sure Tazz will, so . . . just bring it!"

Craig Tate's Deuce mod, featured in the May 2010 issue of CPU. (See page 107.) "You might as well hand the ribbon to me . . . it's all over but the crying," says Tate.

Dewayne Carel created this military radio backpack mod for Cooler Master. His message to the other Mod-Off contestants: "My A-game will be in full force on this one, and you guys will never know what hit you."

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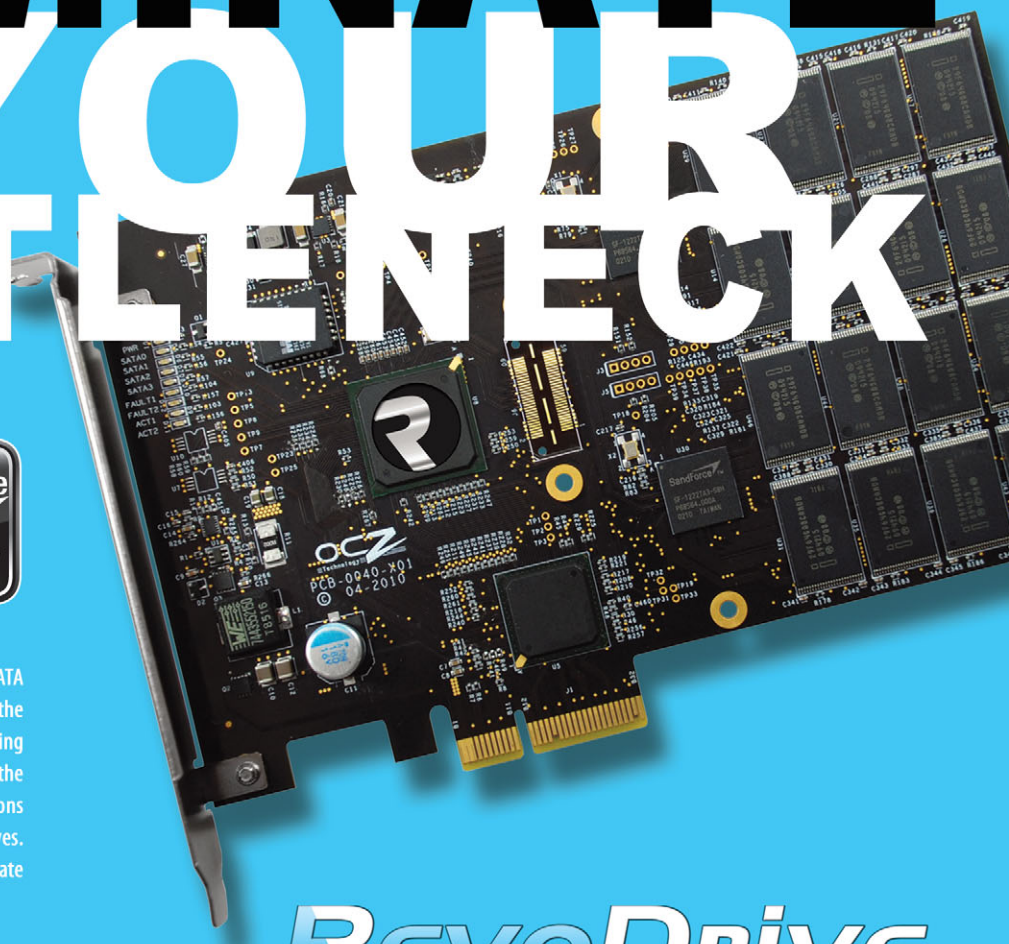

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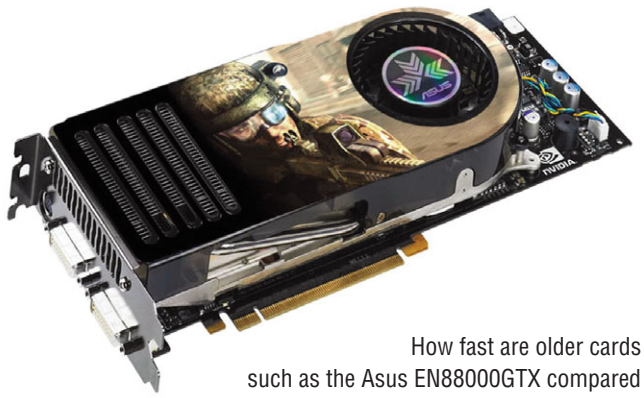
Stephen C. asked: I've been looking at some of the newer hardware specs for video cards and always have wondered how much better the mid- to high-level cards (obviously skipping the cutting-edge cards) are in comparison to my current Asus EN8800GTX. Have you ever done comparisons between higher-end cards from yesteryear and today's budget to midrange cards just to see how big the difference is between both price . . . and bottom-line specs?

A: This is a question that comes up fairly often. Unfortunately, older hardware like the GeForce 8800 GTX you reference does not have a perpetual place in the lab. As modern hardware arrives, older, more dated hardware is ushered out; it gradually disappears from the market, and we don't typically test it again.

The GeForce 8800 GTX is in an interesting case, however. Since the GeForce 8800 GTX's initial release, Nvidia has obviously introduced a number of new GPUs. But there was a time when a whole succession of chips from the company all performed somewhat similarly. If you look back through launch articles for the GeForce 8800 GTX, GeForce 9800 GTX/GTX+, and GeForce GTS 250, you'll find that they all perform within a few percentage points of one another. The GPUs on all of those cards feature 128 stream processors, although there is some variation in terms of clock speeds, ROP and texture unit configurations, and memory bus width.



How fast are older cards such as the Asus EN88000GTX compared to modern offerings? (Hint: Not very fast at all.)

We don't have exact head-to-head comparisons between all three of those cards, using the same test system, drivers, etc., but we can make some general observations based on the results we do have. The GeForce GTS 250 scored 3,077 3DMarks in 3DMark Vantage at launch, compared to the GeForce 9800 GTX+'s 3,057 and the GeForce 9800 GTX's 2,864. Looking further back, the GeForce 9800 GTX scored 13,882 3DMarks in 3DMark06, compared to the GeForce 8800 GTX's 12,746. So, we're talking about an approximate 7.4% advantage for the GTS 250 over the 9800 GTX, and about 8.9% advantage for the 9800 GTX over the 8800 GTX. If we take a bit of a leap, we can say with some conviction that there's about a 16% spread between the GTS 250 and the 8800 GTX, give or take a few percentage points.

With all of that said, the GeForce GTS 250, performs roughly on par with the ATI Radeon HD 4850 (3,077 vs. 3,141, respectively). And the Radeon HD 4850 offers about half of the performance of a modern Radeon HD 5870, to give you an idea of how everything fits together, so to speak, in the current landscape. In addition to performing much lower, however, keep in mind that the older cards also offer fewer features and lack support for DirectX 11.

As for price, finding a new 8800 GTX anywhere other than eBay is next to impossible, so it's difficult to draw any solid conclusions. That being said, the bulk of GeForce GTS 250s retail between $100 and $120, which should give you a rough idea of what your 8800 GTX's performance is worth today.

Betsy H. asked: My husband and I were recently given new Windows 7 laptops. I got a new Acer machine, and he got a Toshiba. Generally speaking, we're both really happy, but we're having a couple of annoying problems. We have an older WinXP machine in our home office, connected to an HP LaserJet that we have shared over the network. On my machine, I can see the shared printer, but I cannot print to it. When I click Print, the office machine throws a "spool 32" error and nothing comes out of the printer.

My husband's problem is a little more confusing. His machine is on the network and has Internet access, but he can't see any machines or printers on the network all at. Can you help?

A: Congrats on the new laptops, Betsy! And yes, we think we can help with your problems. Let's tackle your husband's issue first. Because his machine is on the network and getting Internet access, his problem is most likely related to one of three things: the workgroup name, network discovery, or firewall settings. On your husband's machine, make sure his workgroup name matches yours (and the WinXP machine's) in the Advanced System Settings. Also, be sure to enable network discovery in the Advanced Sharing Settings. Finally, if his notebook came with a preinstalled third-party security suite, try searching for the printer with the suite's firewall disabled. Having seen this issue many times in the past few months, we'd bet that there's an overly restrictive software firewall running on your husband's machine that needs to be tamed a bit.

The error you're receiving when you try to print sounds like some sort of incompatibility between Win7 and the printer's drivers or WinXP's print spooler. The first thing to try to remedy the situation is to install the latest drivers for your printer and then reconnect to it on your laptop. If that doesn't help, you can try bypassing the spooler altogether and printing directly to the printer. On the WinXP machine, open the printer properties and then click the Advanced tab. On the Advanced tab, you'll see an option labeled "Print Directly To Printer." Select that option, apply the changes, restart your machine, and try printing from the new Win7 laptop again.

Bob T. asks: I recently decided I'd upgrade my aging Core i7-920 quad-core chip (I know, just kidding: It's not that old) to something of the six-core variety from Intel. However, I'm having some issues with my motherboard now, and I'm wondering if I'll have to rip that out since it might not support the new 32nm chips properly.

I have a Gigabyte GA-EX58-Extreme motherboard, and it always has performed really well with my 920 chip. I recently purchased a Core i7-970, since it cost about $150 less and has only 133MHz slower core clock than the Core i7-980X. Unfortunately, my GA-EX58 mobo won't boot at all with it, but if I swap the chip back to the Core i7-920, it boots just fine. I tried grabbing the latest BIOS from the Gigabyte site, but no matter what I do, I get a flash program error saying it's an "incompatible BIOS file," or something like that.

I'm stuck and not sure what to do. Any clues? I'd hate to have to return the Core i7-970 or upgrade the motherboard. Also, did I go wrong picking up the Core i7-970? Should I have sprung for the extra money and got a 980X? Are there any other performance differences in the new 970 chip I should know of?

A: Fear not, Bob. You can probably get that board to wake up just fine with your new Core i7-970. (By the way, we like your practical approach of choosing a new processor.) The Core i7-970, like the top-end Core i7-980X, has 12MB of shared L3 cache backing its six processing cores. Other than the clock speed differences you mentioned, the only other difference between the 970 and 980X is the QPI interface speed, which is 4.8GTps for the 970 vs. 6.4GTps for the 980X. You're not going to see much, if any, difference in performance due to QPI speed, however. In general your performance for lightly threaded or single-threaded apps should drop in just under a Core i7-975 quad core.

Gigabyte's GA-EX58-Extreme motherboard might need incremental flash upgrades from earlier revisions of the BIOS before you can flash to the latest revision.

Now, on to your motherboard issue. We've seen this many times over the years, when Intel or AMD release a new core revision, especially chips that have new power requirements, like Intel's new 32nm Gulftown core. Although Intel designs many core migrations to be socket-compatible (though it's not always the case), it's up to motherboard manufacturers to ensure their power supply and regulation components on the motherboard, along with the BIOS microcode that supports it, are compatible with new chip requirements. In your case, the good news is that your Gigabyte motherboard should work with that Core i7-970 just fine.

Likely, what you need to do is go back to Gigabyte's Web site and download older revision BIOS images, perhaps as far back as when Gigabyte introduced the first version that supported Intel's new six-core CPUs for that motherboard. Many times, trying to flash-upgrade with the most recent revision of a BIOS image will fail because, somewhere along the way, the BIOS image check routine of the flash upgrade program determined that your current BIOS image was too old to be considered upgradable. So, in short, you need to perform at least one incremental upgrade from an older BIOS revision before you can move forward and flash-upgrade the BIOS to the latest revision. Once you flash to a BIOS image that is compatible with the most current version, you should be good to go.

At the very least, you should be able to download an older revision of the BIOS that fully supports your new Core i7-970 chip. Good luck! ▲

by Dave Altavilla and Marco Chiappetta, the experts over at HotHardware.com.

For bonus material, subscribers can go to www.cpumag.com/cpuoct10/q&a.

Micropelt's TE-Power Node

Creating "Green" Power From Excess Heat

Most proposals and ideas for "green" energy involve taking existing products and ideas, and figuring out ways to make them use less energy. CFL light bulbs provide the same amount of light as traditional incandescent light bulbs but use about one-fourth the power, for example, while household appliances continue to become more energy efficient.

The next logical step for green technologies is not only to save energy, but also to create energy . . . something that could power a device continuously, without the need for a secondary power source.

Micropelt has shown that such a technology is possible, with its TE-Power Node. The TE-Power Node is a unit that attaches to industrial devices, converting the excess heat (which is waste energy) into electrical power. The TE-Power Node doesn't create a lot of energy, but it is enough to power a wireless sensor.

Energy Harvester: Micropelt

Micropelt, a German company that specializes in energy harvesting, could make batteries obsolete in wireless sensors, thus making them virtually maintenance-free. Energy harvesting involves collecting ambient or waste energies from a system or product, and converting that waste energy to electrical energy that can power a device, such as a wireless sensor, without the need for batteries or a permanent electrical power source.

Micropelt is a 2006 Infineon spin-off, founded in Freiburg, Germany. Burkhard Habbe, vice president of business development at Micropelt, says the company's initial research was with fiber-optic communication systems and micro-cooling devices for lasers. Energy harvesting became a research priority for the company beginning in 2007.

Through its energy harvesting research, Habbe says, the company was able to develop a constant voltage to supply the low-power wireless systems early in 2009. However, he says, the market was skeptical that the technology actually would work in a real-world situation.

"That made us decide for developing a wireless demonstration platform, which would also serve as a 'harvesting meter,'" Habbe says. "Our engineering team did a great job of making best use of off-the-shelf technology, and it took them less than three months to come up with the first version of the TE-Power Node."

Micropelt has begun production of its chips for the TE-Power Node in the second half of 2010. The TE-Power Node currently is available in an evaluation kit. Habbe says Micropelt plans to greatly increase production of TE-Power Nodes in 2011.

According to Micropelt, 1.4 billion wireless sensors were deployed worldwide in 2009 in commercial, industrial, and consumer applications, such as when monitoring: commercial heating units, HVAC units, the conditions of bearings, pressure valves, and the structural condition of machines.

Micropelt's energy harvesting technology can power most wireless sensor networks (WSNs), as long as the unit generating the heat is 10 degrees Celsius (18 degrees Fahrenheit) higher than the temperature of the energy-harvesting unit.

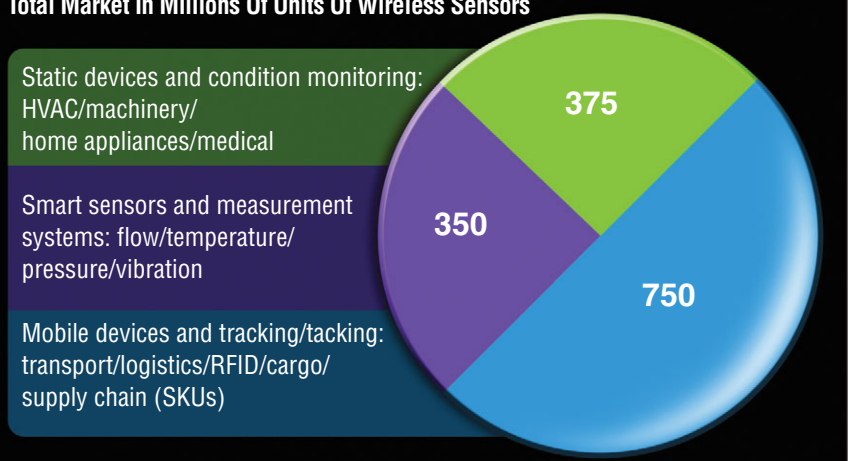
"We just wanted to create enough power to run the [wireless sensor]," Habbe says. "We were surprised at how much headroom we actually had. The

Wireless Sensors Deployed Worldwide

Micropelt estimates that more than 1.4 billion wireless sensors are deployed around the world every year, and the market is growing. Without some sort of ability to generate their own electrical power, each of those wireless sensors runs from battery power, and batteries require maintenance. The TE-Power Node potentially can operate for 10 or more years without the need for maintenance.

Source: Micropelt

Total Market In Millions Of Units Of Wireless Sensors



TE-Power Node did a brilliant job in removing the basis of all skepticism that our chips would not be able to power wireless sensors."

Other Implementations

Although you probably won't see in the near future an energy-harvesting device attached to your computer, making use of the excess heat that the processor generates, Habbe says the concept should work with a variety of implementations, both in the next few years and in the distant future.

"The TE-Power Node concept itself can be made much smaller and cheaper by reducing it to a specific purpose," he says. "A final product may look very similar or totally different. Essentially, it has to implement a thermal path, which provides, on average, sufficient power to match the purpose of the system and the duty cycle demanded by the application."

For example, Habbe says it's possible to see this type of energy harvesting used in home heating and cooling systems in the near future, helping to manage temperature fluctuations for better energy efficiency with no battery maintenance required.

Habbe says it's exciting for Micropelt to be involved in research into this type of energy technology.

"We have just begun to understand the implications of wireless sensing in many areas of professional and personal life," Habbe says. "A due paradigm shift in maintenance alone . . . can have a solid three-figure-billion-dollar impact. [We] can stimulate energy savings to an unforeseeable degree. It is very exciting for us to ride at the top of this wave." ▲

by Kyle Schurman

TE-Power Node Dissected

With TE-Power Node, the system converts the output from the thermoelectric generator (TEG) to a constant voltage.

Micropelt's wireless sensor module works with a low-power microcontroller, the MSP430 from TI, and a 2.4GHz transceiver chip from TI, the CC2500. An inter-integrated circuit connects two digital temperature sensors to the MSP430. A USB receiver connects the wireless sensor to a computer.

The other parts of the TE-Power Node include:

1 Micropelt's MPG-D751 is a TEG mounted on an aluminum base plate with digital and analog temperature sensors. (The TEG measures 0.165 by 0.134 inches.) The aluminum base draws heat from the heat source, and the TEG converts this waste energy to electrical power.

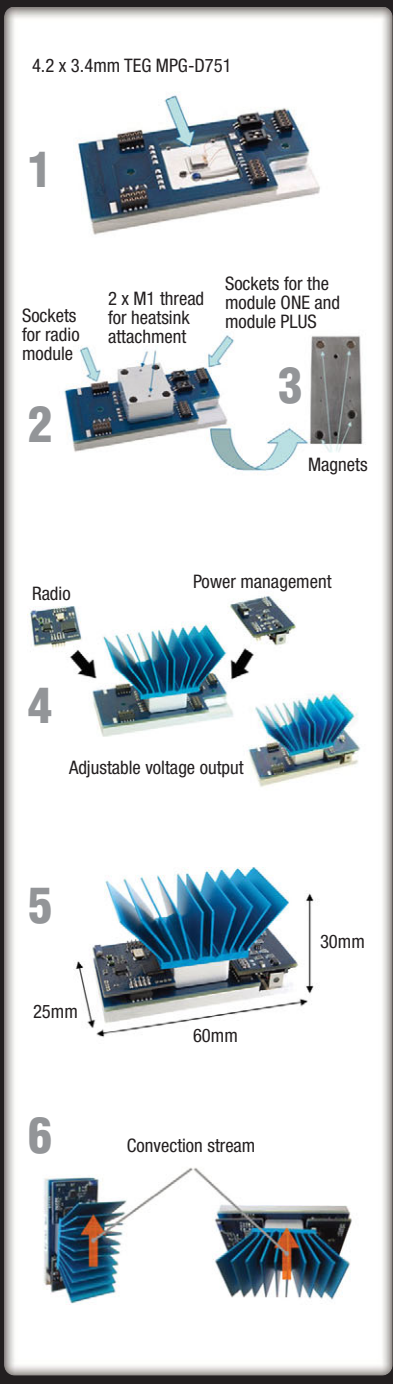
2 The heatsink base attaches to the board above the TEG. The base of the standard aluminum heat sink is 0.6 by 0.6 inches. However, the TE-Power Node can make use of a variety of heatsinks, which allows the customer to select the best one for each situation. The heatsink's fins transmit the heat from the aluminum base to the ambient air.

3 The bottom of the unit includes four magnets for mounting the unit to the heat source, along with two holes for attaching the unit with screws, if the customer desires.

4 Additional boards attach to the main board. They include a radio for transmitting the wireless sensor data, a power management board for the fixed output voltage, and an adjustable output voltage board.

5 Once the standard system is assembled, it measures about 2.36 x 1.18 x 0.98 inches (60 x 30 x 25mm).

6 Proper mounting of the TE-Power Node will have the heat (convection stream) move across the fins, and the mounting is important to achieve the proper heat transfer. If the fins cannot dissipate the heat, the overall system will not be as efficient at generating electrical power because the temperature differences will not be as large.



Source: Micropelt

White Paper: OASIS

Meet The World's Smartest Countertop

Quick quiz: Would you know a cherimoya fruit if you saw one? How about a sea bean or bok choy?

If you wouldn't know those fruits and vegetables from an Ugli fruit, how would you feel if your kitchen countertop showed you up by identifying all of them in less than a second?

Beverly Harrison, a senior scientist with Intel Labs Seattle, teamed with University of Washington graduate students Ryder Ziola and Nate Landes to create OASIS (Object-Aware Situated Interactive System), which is an interactive display system that can recognize objects and human gestures. They demonstrated OASIS for the first time in the summer at the Research@Intel Day 2010, completing an intense several months of research and development.

OASIS creates interactive surfaces—what the researchers call "islands"—in everyday environments, such as kitchen countertops. Using a combination of object- and gesture-recognition tools and algorithms, depth cameras, and pico projectors, OASIS can create an interactive display on almost any flat surface. The system tracks physical and virtual objects, displays menus and content, tracks user gestures, creates GUI buttons, and pulls relevant information from local and Internet databases.

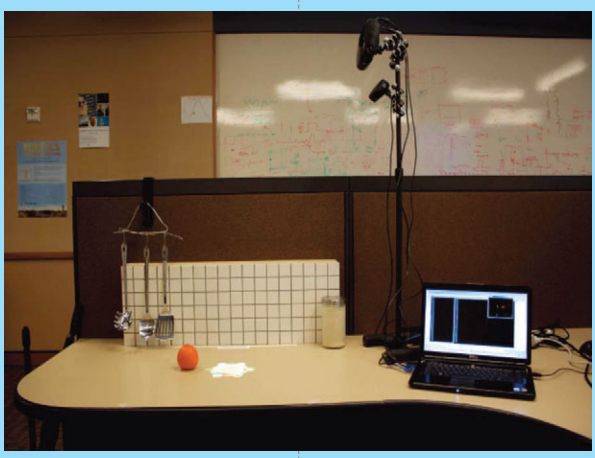
OASIS Research

Harrison has been looking at interactive systems for more than a decade, and technological advances have finally made a system such as OASIS a reality.

"I've been looking at combined virtual and physical systems for more than 15 years," Harrison says. "Many things have changed from when I looked at it 15 years ago. . . . Three to four years ago, Intel started looking at these pico projectors, thinking they would be good for this type of project."

The OASIS System Demonstration

In the system demonstrated at Research@Intel Day, all of the software required to run OASIS (Object-Aware Situated Interactive System) worked on a 2GHz dual-core Dell Inspiron laptop (bottom-right corner of the photo). OASIS makes use of a variety of types of software, including rendering software, calibration software, computer-vision algorithms, and GUI software. The computer can be hidden behind the scenes while the user gestures and interacts with the countertop surface.



The projector used for the output was a 170 lumen SVGA LED projector along with a depth camera (shown at the top of the pole in this photo). Input for the OASIS system involves using a depth camera (sometimes called an RGB+D camera). The camera collects the required input information for object recognition and tracking, as well as finger input detection. During the demonstration, the camera was mounted 30 inches above the counter. The 320 x 240-pixel depth camera captures both RGB data and depth data.

Microvision provided the pico projector for the demonstration, while PrimeSense provided the depth camera. Beverly Harrison, a senior scientist at Intel Labs Seattle, says both components were advanced prototypes.

"There are a bunch of pivotal components to make this system work," Harrison says.

Eventually, Harrison says, the OASIS system will use laser pico projectors because of their small size and because the system will not need adjustable focus capabilities. When using a stationary surface, such as a kitchen countertop, the projector will require only one plane of focus, allowing for less complex projectors.

During the demonstration, the projector and the camera both used approximately the same field of view on the countertop, about 24 x 36 inches (LxW).

Finding projectors that were bright enough was a challenge, Harrison says. An average conference room projector provides about 1,200 lumens.

"Clearly, over time, brightness and power consumption are competing as tradeoff issues," Harrison says. ▲

Source: Intel Labs, Research@Intel Day

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Mac OS X 10.4
Linux KERNEL 2.4
Accessories: USB3.0 cable

NH03

Capacity: 1TB, 1.5TB, 2TB
Color: Black
Dimensions (LxWxH): 150x48x178mm
Weight: 1Kg
Interface: SuperSpeed USB 3.0, downward compatible with USB 2.0
System Requirements:
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Mac OS X 10.6 or later
Linux KERNEL 2.6.31 or later
Accessories: USB 3.0 cable, AC adapter
Texture: Polished surface housing

NO04

Capacity: 64GB, 128GB, 256GB
Color: Blue
Dimensions (LxWxH): 100x70x10mm
Weight: 87g
Interface: USB 3.0+SATAII Dual Interface
System Requirements:
Windows 98, 2000, XP, Vista, 7
Mac OS X 10.4
Linux Kernal 2.4 or later
Accessories: USB3.0 cable
Texture: Brushed metal finish

NO05

Capacity: 16GB, 32GB, 64GB
Color: Gray
Dimensions (LxWxT): 90x20.5x11.5mm
Weight: 20.5g
Interface: Support USB 3.0 compatible with USB 2.0 & USB 1.1
System Requirements:
Windows 98, 98SE, ME, 2000, XP, Vista, 7
Mac OS 9.0 or later
Linux Kernel 2.4 or later
Texture: Aluminum body with metal finish
Note: USB3.0 Performance up to Read:85MB/s; Write:55MB/s

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She teamed with the University of Washington students late last year.

"In the computer science department in general, we recruit graduate students," Harrison says. "We're very proactive in trying to get students interested in new technologies."

Ziola is a graduate student in the computer science department who had worked with an interactive projector project in the past before joining the OASIS research team. Landes is a visual design school student at Washington, and Harrison says that before working with Intel, the design school has worked with related projects in the past, such as designing a "home of the future."

"The three of us started last fall and worked from about November to April," Harrison says. "It was intense. . . . Both of them had a great experience. In terms of the project, this [collaboration] produced a fantastic outcome."

During the OASIS project, the team was able to build on past research with interactive systems.

"It reduced unknowns and risks," Harrison says. "Our lab has also had a long-term interest in applying machine learning techniques to people, objects, and gestures."

Harrison says recognition systems 15 years ago relied on reading bar codes on products. Past projectors were large, leaving them to be used primarily in conference rooms for business applications and white boards. Newer technologies have made a system like this finally possible, Harrison says.

"The size and form factor of the cameras, plus the advent of depth cameras [are key]," she says.

The OASIS System

The OASIS system makes use of depth cameras and pico projectors, which are very small projectors that can be about the size of a digital still camera. The pico projectors don't use a lot of power. In fact, the OASIS system can draw power from already-installed lighting circuits in a kitchen, for example.

"This project is much cheaper than . . . Microsoft Surface . . . and much more deployable," Harrison says.

Harrison says that the team had three goals when they began work on OASIS: develop an improved understanding of how design affects object-aware interactive systems; better predict how users would interact with the system; and develop an interactive system that can create the "islands" in everyday environments.

The key to the OASIS system is its ability to blend physical objects with virtual actions, Harrison says, making the interactions seem natural to users. Additionally, the system must address how to create new objects, delete objects, create groups of objects, and save interactions with certain objects for later use, all of which were part of the researchers' system design plans. Users also must have the ability to recover from errors, either by undoing an action or by "backing out" of a series of commands.

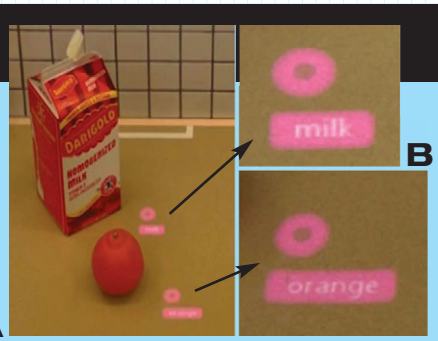
OASIS uses computer vision to identify physical objects. For example, when an orange is placed on a kitchen counter—the "island" for the OASIS system—the system uses its camera and software to recognize the object. It then projects a virtual text label and interactive button next to the object.

For the demonstration, Harrison says, the OASIS system used a 3D representation of the counter with no objects on it as

Identifying Objects

The OASIS system recognizes objects as they're placed on the countertop (**A**). The projector displays a "button" along with the name of the object. The buttons—also called interaction points—usually appear less than a second after the object is placed on the countertop (**B**). ▲

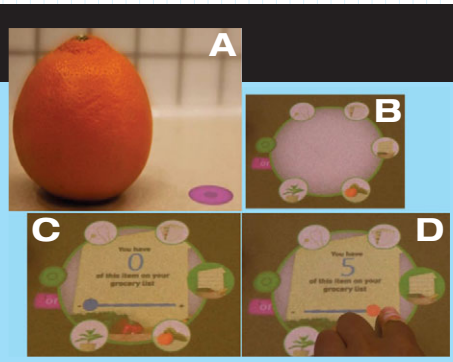
Source: Intel Labs, Research@Intel Day



Putting Objects To Work

You have many options for using the objects that OASIS recognizes. In this example, the orange is placed on the countertop, and the system creates a button for it (**A**) and a text label (not shown). By "pressing" the orange's button, you'll open a menu of options (**B**). Menu options could include finding recipes that use oranges, finding related fruits and ingredients, or finding more information on oranges through the Internet. All of the menu options are related to the object in question. In this example, the user has selected the grocery list button (marked with a large green circle in the C and D photos). The user can add oranges to the grocery list by dragging the blue slider button (**C**), which turns orange as the user slides it to add five oranges to the list (**D**). ▲

Source: Intel Labs, Research@Intel Day



a reference. Then, as users placed objects on the counter, OASIS would compare the original, empty 3D scene to the new scene. The system computes the depth of an object using infrared light measurements.

"Anything that appears becomes an object of interest, and the system starts trying to recognize it or track it," Harrison says. "Because we have a 3D model of the background, it doesn't have to be a flat background."

The system works on almost any type of surface, including highly polished granite or copper. Harrison says a strong wood grain in a surface can cause some problems with the system, such as showing legible text.

By using a depth camera, the OASIS system is able to distinguish between a finger hovering over the counter surface and a finger that's actually touching the surface. The system does this by measuring the location of the fingertip in the 3D space and then aligning it to a vector that's perpendicular to the counter surface. When that vector reaches a certain point in the 3D space, the finger is registered as touching the countertop.

Key Design Components

Harrison says three components were central to the design of OASIS.

Object recognition. The OASIS system can make use of built-in databases and can mine Internet databases to help it recognize objects. The decision to include the capability to access a variety of databases was important, Harrison says, because it adds another level of functionality to OASIS.

Finger tracking. Harrison calls the finger tracking built into OASIS a simple version of gesture recognition.

"What we're mainly doing for the applications is to separate what is a 'hover' versus a 'touch' point," Harrison says. "It's kind of like the stage zero of building a gesture recognition system."

The depth camera provides the key to determining the hover versus a touch.

"Without a depth camera, you need to use some tricks [to distinguish between a touch and a hover]," Harrison says. A depth camera "obviously greatly improves accuracy of determining the user's intent."

Building applications. Designing OASIS' interactive feel was very important, Harrison says, because the system needs to be as easy to use—and as natural to use—as possible.

"We did not want to make it look like we were using a projector to splash a Windows desktop," Harrison says. "It should feel more like it's centered around the task that it's trying to accomplish."

The design behind the applications needed to provide necessary feedback to users while avoiding confusion.

"There were lots of questions," Harrison says. "'How do you show when something is recognized?' 'How do you put down an entry point?'

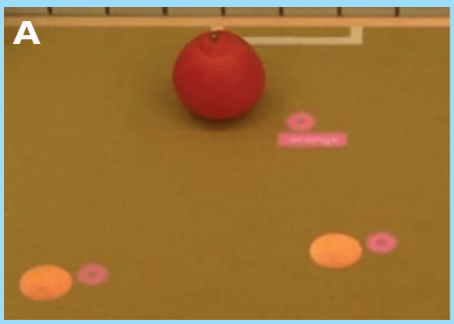
"A lot of discussion was about whether to launch things automatically or to make it all manual. How do you error-correct? There has to be a graceful way of backing out from an error."

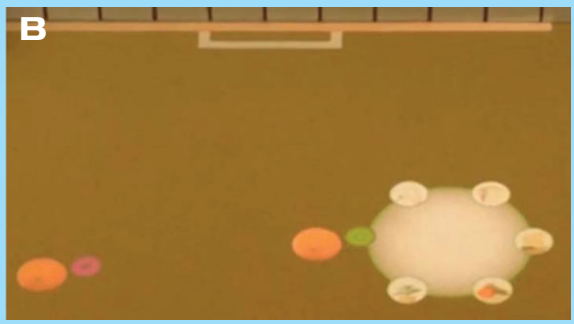
Design Challenges

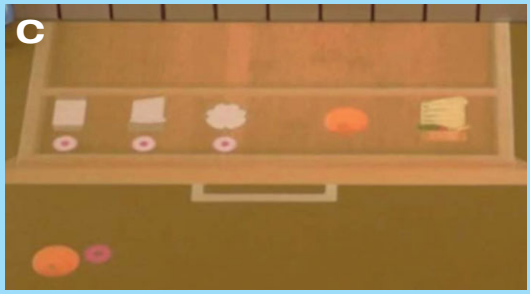
Some of the challenges the OASIS system might encounter when trying to read objects include the following: interference from other sources of infrared light, surfaces that don't reflect infrared light, highly reflective surfaces with busy patterns (such as detailed wood grains), transparent objects (such as plastic water bottles), or gestures from hands with a lot of jewelry. However, Harrison says improved hardware and other advancements in OASIS' underlying technologies should help the system overcome these challenges in the near future.

Virtual & Physical Objects Working Together

OASIS can use a mix of physical and virtual objects on the countertop, and the physical and virtual objects work in the same fashion whenever it makes logical sense to the system. In other words, you can perform the same functions on an object, whether it's virtual or physical.

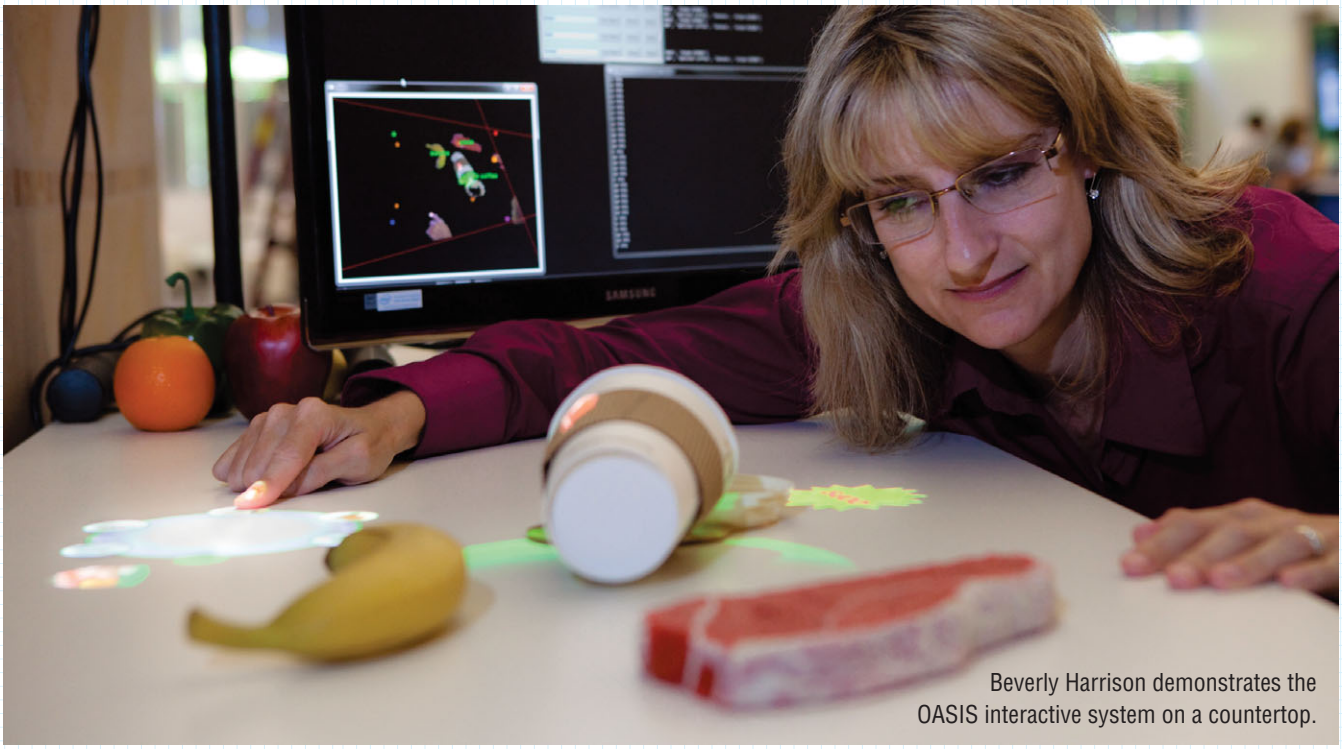






After placing an orange on the counter (**A**), OASIS recognizes it. The user can touch the physical orange's button and drag and drop to make virtual copies of it. When the physical orange is removed (**B**), the virtual oranges remain available for performing menu tasks. To remove the virtual oranges, you can place one in the virtual drawer (**C**), making it available later, or you can simply use your finger to touch and drag it off the edge of the countertop. ▲

Source: Intel Labs, Research@Intel Day



Beverly Harrison demonstrates the OASIS interactive system on a countertop.

Some of the other challenges for OASIS have been controlled through the design process.

System boundaries. Most systems have boundaries, such as the distance limitations of a Wi-Fi network or cellular phone network. Those networks often use a system of signal strength bars to tell users when they are close to the system's boundary.

With OASIS, the system projects lines on the counter that show the boundary whenever the user initially interacts with the system. Those lines fade away to avoid clutter on the countertop, unless the user places an object near the boundary. The lines will then reappear.

System startup. With OASIS, the system goes into a "sleep" mode whenever it doesn't detect any movement after a set period of time. Once it detects any movement of a physical object or hand gesture inside the system boundaries, the system immediately "wakes up" and begins tracking. Users don't have to use a particular on/off gesture.

Ignoring the system. With the "always on" aspect of OASIS in mind, how do users tell the system when they *don't* want it to track an object within OASIS' boundaries? With OASIS, if the user has placed a stray object inside the boundaries, the system will recognize it and create a button. However, if the user takes no further action with the object, the object's button and virtual representation will simply fade away after a certain amount of time.

Future Of OASIS

Although the initial demonstration of OASIS used a laptop computer, Harrison says additional research work has included driving the system with a workstation, a set-top box, or even a cell phone with a pico projector built into the phone. It's possible that a 1GHz Atom processor could power the system.

"We've experimented with different form factors," Harrison says. "The components allow us to open the door to other applications. I [don't] want to drive it on high-end workstations. Eventually, I want to use the Atom and a smartphone. . . . It creates an environment where you can try a lot of new things. I think it will migrate to a lot of things. It's a small step to get a phone with a projector."

Harrison says the research team has received quite a bit of attention and positive feedback since the initial demonstration, and the project may receive more attention after an additional, more detailed demonstration in October.

"We've had lots of press coverage," Harrison says. "It tells a story everyday people can relate to."

Harrison says the researchers don't focus on the potential commercialization of OASIS, and they don't make predictions about if or when the system could appear in homes.

"Beyond the scope of our research, we don't speculate on those cycles," she says.

Although the OASIS' initial demonstration focused on kitchen and food applications, the system can work for many different types of applications that require a mix of physical and virtual interactions. Any countertop would work, such as a kitchen, bathroom, or coffee table.

With OASIS, you have the chance to turn any surface into a "smart" countertop. Just don't feel bad if it appears to be smarter than you when it correctly identifies the weird piece of fruit that your spouse brought home from the grocery store. ▲

by Kyle Schurman

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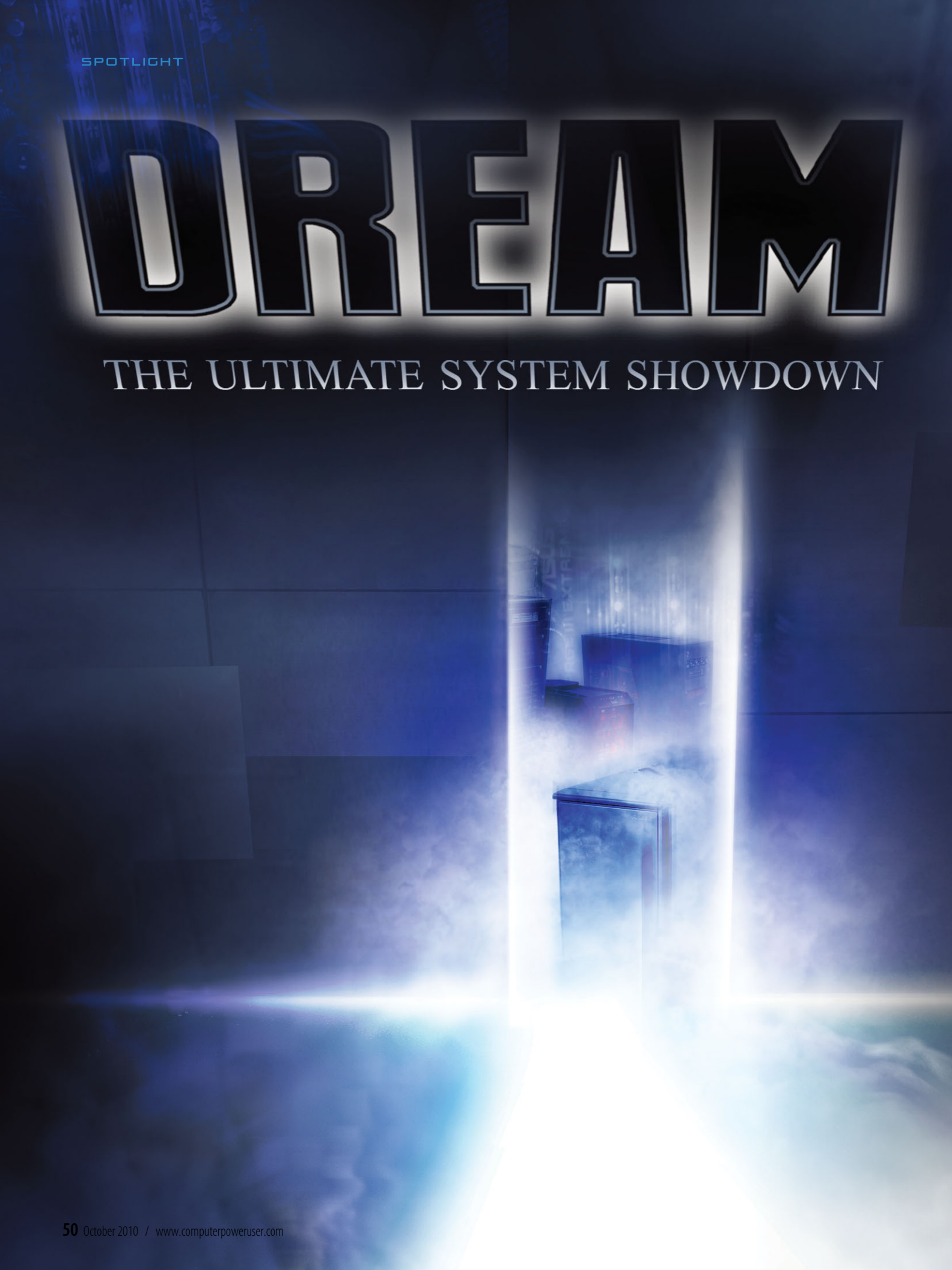

PCs

Once a year, *CPU* drills deep into the heart of modern computing, takes a core sample, dissects and assesses, and brings the results of our subsequent analysis to you in the form of this article. For the top system vendors on the planet, it's a chance to size up the competition, hone their talents, and show off before an audience of ardent computing enthusiasts. For the rest of us, it's a chance to exercise our salivary glands. Strap in and hold on tight, because this year's dream PCs go over the top and make last year's benchmark busters look like unwieldy iPads.

The Pulse Of The PC Industry

Asking the best PC engineers in the business to give us their best shot also provides us with an expertly informed snapshot of the best configurations money can buy. Even if you can't afford one of these visions in silicon, you can still use them as a blueprint for building your own on a much more wallet-friendly scale. Performance and reliability are what matter most, not the brands and logos of individual components.

In the category of processors, the chip that leads the pack is the Intel Core i7-980X Extreme Edition, which showed up in seven of 16 systems, many of which were liquid-cooled and featured overclocks above 4GHz. A pair of Intel Xeon X5680s dominated at the top end, while "entry-level" systems (nowhere else will a $3,000 system have an "entry-level" label) shipped with Intel Core i7-875K, 930, and 970 processors. Only one system featured AMD's Phenom II X6 1090T. Seven of the systems' motherboards came from Asus, six came from Evga, and two each came from MSI and Gigabyte.

The graphics card of choice was overwhelmingly the Nvidia GeForce GTX 480 (most of which came from Evga); nine systems used it in 2-, 3-, and 4-way SLI. Four systems shipped with one or two ATI Radeon HD 5970s. Three systems bucked the flagship graphics trend with a pair of GTX 470s, GTX 460s, and 5870s, respectively.

For system memory, 6GB seemed to be the enthusiast sweet spot, as most builders chose this amount. 12GB systems were also common, but a few systems shipped with 4GB or 8GB. One even came with 24GB.

Tiered & True

For this round of Dream PCs, we solicited systems in three pricing categories, which we'll refer to as Tier I (up to $3,500), Tier II ($3,501 to $7,000), and Tier III ($7,001 and up). We benchmarked each system using the same suite of tests and applications, all at the same resolutions and same settings, which let us compare them with similarly priced systems, as well as make statements about their overall performance. Prices listed were the configurations we tested, at press time. Without further ado, we bring you the pinnacle of PCs for 2010. ▲

CyberPower Gamer Xtreme XT-K

At a hair under $3,000 and the second-least expensive PC in our roundup, the CyberPower Gamer Xtreme XT-K is kind of a bargain, holding its own against the competition.

CyberPower used the relatively pint-sized and light Xion Predator 970 case for the Gamer Xtreme XT-K. Like most of the Dream PC submissions this year, the case is plain-Jane black, but this one also features a big, bright touch panel on the front where you can adjust the speeds of each fan (four total) and check temps. You can also toggle between viewing the temperatures in Fahrenheit or in Celsius, if you're into that sort of thing.

The case also offers front access to the hard drive bay, so you can access up to two drives behind a small swinging door. The liquid-cooling setup is compact with thin tubing, which helps increase airflow and also makes it easier to work inside the case if and when the need arises.

Despite its diminutive size, the Gamer Xtreme XT-K packs in plenty of good components. The Intel Core i7-875K is overclocked to a solid 3.84GHz, and the dual Radeon 5970s in CrossFire provide excellent graphics horsepower. CyberPower kept the storage setup simple but strong with a single 80GB Intel X-25M for the OS and 1TB of storage via the Western Digital Caviar Black drive. By including 8GB of Kingston HyperX RAM, CyberPower gave the Gamer Xtreme XT-K an extra bit of oomph.

Its benchmark scores certainly hold up to other, more expensive PCs in its tier, even surpassing some of them in several tests including 3DMark Vantage, PCMark Vantage, SiSoft Sandra Memory tests, and Left 4 Dead 2. The system's few weaknesses did emerge in POV-Ray 3.7 Beta, Aliens vs. Predator, and S.T.A.L.K.E.R., but on the whole it performed above its pay grade, so to speak.

Although it's a mite strange to say this about a dream PC, the CyberPower Gamer Xtreme XT-K offers nice bang for your buck. Nothing about it is especially pricey or gaudy; CyberPower seems to have chosen high-performing parts for the build without relying on the doubling or tripling of components (with the exception of the dual graphics cards).

At this price, perhaps this system is a dream PC that may actually come true for an enthusiast with a few Benjamins to spend on a killer system. ▲

Gamer Xtreme XT-K
$2,999
CyberPower
www.cyberpowerpc.com

Specs: CPU: Intel Core i7-875K @ 3.84GHz; Motherboard: Gigabyte P55A-UD4P (Intel P55); GPU: ATI Radeon 5970 (2-way CrossFire); RAM: 8GB Kingston HyperX DDR3-1600; Storage: 80GB Intel X-25M, 1TB Western Digital Caviar Black; PSU: Corsair HX-1000W; ODD: Asus BC-06B1ST; OS: Windows 7 Home Premium (64-bit)

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Tom's Hardware

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Bjorn3D

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We'd categorize the GIGABYTE X58A-UD3R's performance as "excellent".
Hot Hardware

GA-H55N-USB3

MUST HAVE EDITOR'S CHOICE AWARD! TweakTown

Powerful,Small, Innovative,Inexpensive. What is not like about the GIGABYTE H55N-USB3?
TweakTown

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Proclockers

Benchmark Reviews.com

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Benchmark Reviews

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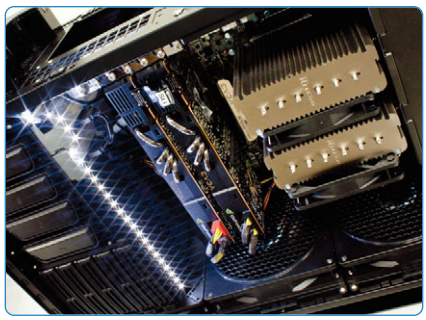
Digital Storm Black OPS Assassin Edition

The Black OPS Assassin is a vertically designed system, so the motherboard's rear I/O ports are on the top of the case, though the case's top panel conceals any external cabling and routes it toward the back of the system. Natural heat convection—combined with three 180mm fans at the bottom of the case and a 120mm fan at the top—move hot air out of the top of the system. The end result is a system that's excellent at both pulling in cool air and pushing out hot air. When we put our hand above the top of the case, we could feel heat rising from all along the metal mesh, not just over the GeForce GTX 480 graphics cards.

As you might guess from the system title, the BlackOPS is a black-clad system—both internally and externally. The one exception is the silver Noctua cooler and the silver Evga X58 FTW3 heatpipe on the motherboard. To light the interior, Digital Storm installed an LED light strip that provided gentle white illumination of the system interior. We preferred this lighting to harsh cold cathode lights. The power supply and the storage drives are hidden away in compartments inside the Silverstone FT-02 case, which places your focus directly on the hardware on the motherboard. For convenience, Digital Storm installed the 1TB Hitachi Deskstar into the case's hot-swap bay, which gave us the ability to switch storage drives in and out.

Digital Storm overclocked the Intel Core i7-930 from 2.8GHz to 4GHz using a Noctua NH-D14, which features six heatpipes and dual fans. The two graphics cards were Evga's GTX 480 Superclocked, which offer bumps to the core, memory, and shader clocks. For quick boot and load times, Digital Storm installed the OS onto an 80GB Intel X-25M. The Black OPS Assassin sent to us also featured a BD/DVD player optical drive and a second 24X DVD burner. The system is designed to handle Nvidia's 3D Vision Surround setup, and Digital Storm sent in three 3D displays and 3D glasses that worked great in our brief 3D testing. Digital Storm indicated that the 3D hardware can be configured as an optional $1,478 add-on for the Black OPS Assassin, so it's not included in the current configuration price.



Priced into our Tier I, the Black OPS Assassin provided some of the top scores in 3DMark Vantage, PCMark Vantage, and in all the gaming tests. Some of the Tier I competition opted to use the six-core Intel Core i7-970, which outshined the quad-core Intel Core i7-930 in our processor-based benchmarks. That being said, the Black OPS Assassin featured well-rounded component scores, as it was top in Sandra 2010's Memory Bandwidth and near the top in the Physical Disks speed. The balanced design can be seen in PCMark Vantage's 14129 score.

We'll give Digital Storm props for using an ingenious airflow design and cool-looking system lighting. The Black OPS Assassin also provided a lot of gaming pop for a Tier I performer, and when you combine construction and performance results, it's top-notch for the price range. ▲

Black OPS Assassin Edition
$3,226
Digital Storm
www.digitalstormonline.com

Specs: CPU: Intel Core i7-930 @ 4GHz; Motherboard: Evga X58 FTW3 (Intel X58); GPU: Evga GeForce GTX 480 SuperClocked (2x, SLI); RAM: 6GB Mushkin DDR3-1600; Storage: 80GB Intel X-25M, 1TB Hitachi Deskstar; ODDs: Lite-On 109-29 BD Combo, Pioneer DVR-218L; PSU: Corsair HX1000W; OS: Windows 7 Home Premium (64-bit)

iBuyPower Paladin XLC

iBuyPower tells us that the Paladin XLC is designed for performance-oriented buyers who are also focused on reliability, aesthetic design, and value. In short, it's more of an all-around performer than a pure gaming beast. The Paladin XLC sent to us featured Intel's six-core Core i7-970 overclocked to 4.04GHz, an OS volume created with two 64GB Kingston SSDNow V Series in RAID 0, and two Asus Matrix 5870 Platinums in CrossFire.

The Paladin XLC is built in a red (both inside and out) NZXT Phantom case, which we found to be plenty roomy. Two 120mm fans on the side of the case blow cold air over the graphics cards, while a 360mm mesh opening in the side panel allows for heat to passively move out of the system. There are two 200mm fans at the top of the case, where iBuyPower also installed the 240mm liquid-cooling radiator for the Asetek 570LC. The interior of the case looked great. iBuyPower added cable harnesses made of individually black-wrapped wires. The result was that even the visible wires weren't distracting to the eye.

The two 64GB Kingston SSDNow VSeries SSDs set up in RAID 0 seemed to save us several seconds, in comparison to other systems, each time we loaded an application. And combined with the overclocked, six-core Intel Core i7-970, the Paladin XLC was snappy to respond during all our testing. Other speedy conveniences inside this build included a 10X BD-ROM drive, a 22X DVD burner, and USB 3.0.

As we expected, the Paladin XLC performed extremely well in our processor benchmarks, including the top mark among Tier I systems in Cinebench 11.5, POV-Ray 3.7, and several of Sandra 2010's processor benchmarks. It also wasn't a terrible performer in games, with 136.05fps in Left 4 Dead 2, 32.9fps in Aliens vs. Predator, and 44.1fps in S.T.A.L.K.E.R.: Call of Pripyat. Those quick load times we experienced were backed by a 360MBps speed in Sandra 2010's Physical Disks test. The Paladin XLC's processor-centric design is shown in 3DMark Vantage, where it delivered a 36843 CPU score.

The iBuyPower Paladin XLC was one of the few colorfully painted systems we saw this year. It also meets iBuyPower's goals of a value performance system with high benchmarks in our processor, memory, and storage tests to deliver a system that's good in most areas and exceptional in a few. ▲

Paladin XLC
$3,499
iBuyPower
www.ibuypower.com

Specs: CPU: Intel Core i7-970 @ 4.04GHz; Motherboard: Asus Rampage III Formula (Intel X58); GPU: Asus Matrix 5870 Platinum (2x, CrossFire); RAM: 6GB Corsair Dominator DDR3-1333; Storage: 64GB Kingston SSDNow VSeries (2x, RAID 0), 1TB Western Digital Caviar Black; ODDs: Lite-On iHOS104-08, Samsung SH-S222L; PSU: Thermaltake TR2 RX 1,000W; OS: Windows 7 Home Ultimate (64-bit)

Puget Systems Serenity Mini

When you buy a system from Puget, the builder makes sure that you know what was done step by step when building your custom PC. After we configured our Serenity Mini, Puget immediately began assembling it and provided us a Web link where we could track the system's progress in real time, including during the benchmarking process. And when the Serenity Mini was ready to be sent out, Puget sent us photos of the finished product.

The Serenity Mini sent to us is designed to be a quiet, portable gaming system. To keep the system noise to a minimum, Puget chose the Antec Mini P180, which includes three-layer side panels to prevent noise from exiting the interior. Puget also installed a Gelid Tranquillo air cooler that's designed to run silently, and it helped Puget push the Mini's Intel Core i7-875K to 3.7GHz. There are two Evga GeForce GTX 460 graphics cards in SLI stacked directly beneath the CPU cooler, but the dense design did not poorly impact the Serenity Mini's performance during our testing. Airflow to the components on the motherboard was helped by the "floor" that separates the power supply from the motherboard. A front 120mm fan pushes air directly over the two GeForce GTX 460s, and a 230mm top fan pulls hot air from the CPU cooler and memory.

Considering the limited space inside the Serenity Mini, Puget did an excellent job concealing the system cables. The one spot where cables were visible was the drop-down slots for the PCI-E power cords running to the graphics cards. The interior of the Serenity Mini has room for larger graphics cards, but Puget wanted to keep both the price and weight of the gaming system to a minimum. In total, the system weighed a little under 34 pounds, which is around 15 to 20 pounds lighter than many, if not all, of our other dream PCs.

The Serenity Mini's scores were generally lower than most of the Tier I competition, but we'd be remiss if we didn't point out that the system is priced $500 to $1,000 lower than its competition. The main difference is the power of the GeForce GTX 460s against higher-powered graphics cards. For example, the Serenity Mini's frames per second results in our gaming tests (81.02fps in Left 4 Dead 2, 36.8fps in Aliens vs. Predator, and 9.3fps in S.T.A.L.K.E.R.: Call of Pripyat), were 15 to 30fps lower than the other Tier I systems.

But in our processor-intensive benchmarks, such as Cinebench 11.5 (6.3 points) and Sandra 2010's Processor Arithmetic (106.2 GIPS), the Serenity Mini is competitive.

Puget definitely met its goals of quiet and lightweight. And as long as we didn't plan on gaming at the highest resolution, we saw playable frame rates in our games. The multiple additions to reduce system noise also show us that Puget knows how to select parts that achieve your custom build goals. ▲

Serenity Mini
$2,444
Puget Systems
www.pugetsystems.com

Specs: CPU: Intel Core i7-875K @ 3.7GHz; Motherboard: Asus Maximus III Gene (Intel P55); GPU: Evga GeForce GTX 460 (2x, SLI); RAM: 4GB Kingston ValueRam DDR3-1333; Storage: 80GB Intel X-25M, 1TB Western Digital Caviar Black; ODD: Pioneer DVR-218L; PSU: Corsair TX 850W; OS: Windows 7 Home Premium (64-bit)

Smooth Creations Battlefield Prophet

If you're a regular reader of *CPU*, then you've probably come to expect visual delights from Smooth Creations, and the Battlefield Prophet, even as one of the least expensive systems in this roundup, fits that description better than most other systems here. The system utilizes a stock Cooler Master ATCS 840 chassis wrapped in a Battlefield Bad Company 2-themed decal and topped off with a clear coat to ensure a durable, long-lasting finish. There's also a good amount of airbrushing on the top panel, front panel, and edges to make sure everything blends together well. The end result is striking. We've seen glorified stickers on PCs before, but this one is particularly good. The right side panel has a large acrylic window that reveals a clean interior and a tidy wiring job. On the inside, the Battlefield Prophet features tons of open space to make sure heat has a quick path to all the exits.

Smooth Creations decided to put the brakes on the Intel love fest with a rival suitor, namely AMD, in the form of the Phenom II X6 1090T Black Edition processor. Smooth Creations managed to overclock the processor to 4GHz using the Corsair Hydro Series H50 CPU Cooler, which is an integrated CPU block and pump that circulates liquid through a radiator in a closed loop. For the motherboard, Smooth Creations chose the Asus Crosshair IV Formula, which utilizes the AMD 890FX chipset. Due to the dual-channel limitation of the processor's memory controller, Smooth Creations opted to install 8GB of Corsair XMS3 DDR3-1333 memory.

On the graphics front, the Battlefield Prophet is the only system in this roundup to feature a single graphics card, the ATI Radeon HD 5970. For the storage subsystem, there's a single 128GB Western Digital SiliconEdge Blue SSD for the OS and applications and a single 2TB Western Digital Caviar Black HDD for media files and mass storage. Presumably in a bid to keep the system price down, Smooth Creations installed an inexpensive Lite-On iHAS224 DVD±RW drive. The system features a 1kW Cooler Master Silent Pro M, so you can upgrade the system with a second graphics card and several additional peripherals without breaking your power budget.

Although the aesthetics and AMD components made the Battlefield Prophet stand apart, they didn't do this system any favors against our suite of benchmarks. Overall, it didn't break into the top 10 in any single test, but when compared to the rest of the Tier I systems, it did manage to achieve third place for Sandra's Processor Multi-Media benchmark and third place for Cinebench 11.5 and POV-Ray. With Smooth Creations, we like what we see, but other systems managed to achieve better performance under similar budget constraints. ▲

Battlefield Prophet
$3,150
Smooth Creations
www.smoothcreations.com

Specs: AMD Phenom II X6 1090T Black Edition @ 4GHz; Motherboard: Asus Crosshair IV Formula (AMD 890FX); GPUs: ATI Radeon HD 5970 2GB; RAM: 8GB Corsair XMS3 DDR3-1,333; Storage: 128GB Western Digital SiliconEdge Blue SSD, 2TB Western Digital Caviar Black; ODD: Lite-On iHAS224 DVD±RW; PSU: Cooler Master Silent Pro M 1,000W

V3 Gaming Avenger

For $3,499, it's hard to do much better than the V3 Avenger, a PC at the price ceiling of its tier with specs and scores to match. In fact, in some benchmarks, it kept pace with much more expensive systems.

V3 opted for a vinyl overwrap as opposed to a paint job to save costs (the former was $150 while V3 states the latter runs closer to $500). It's also designed to be more durable than paint, but if you have some extra cash to spare, you might want to opt for a slick paint job as opposed to the all-black vinyl design.

Inside the case, the custom Asetek LCLC liquid-cooling rig uses tubing that is small, black, and subdued—a nice feature that delivers the benefits of liquid cooling without being obnoxious or taking up much space.

V3 specifically designed the Avenger system in anticipation of Nvidia's 3D Vision technology, specifically 3D Vision Surround. The Intel Core i7-930 is overclocked from 2.8GHz to 3.8GHz, courtesy of V3's free V3 Launch Cool overclocking service, and the Tri-SLI Zotac GeForce GTX 480s certainly contribute to the system's performance, as well, with more than ample graphics firepower to support 3D Vision Surround. The OS volume consists of a pair of 64GB Crucial RealSSD C300s, with 2TB of storage courtesy of two 1TB Hitachi Deskstars. It also features a 10X Blu-ray reader and DVD-RW combo drive.

The V3 Avenger had good but slightly inconsistent benchmark scores, taking top marks in its tier in Left 4 Dead 2, Aliens vs. Predator, SiSoft Sandra's Physical Disks test, and the overall 3DMark Vantage and PCMark Vantage scores. However, it didn't do especially well compared to the competition in Cinebench 11.5, POV-Ray 3.7 Beta, and several of SiSoft Sandra's other tests.

The V3 Avenger is a solid performer with plenty of headroom to spare in the graphics and hard drive departments. ▲

Avenger
$3,499
V3 Gaming
www.v3gamingpc.com

Specs: CPU: Intel Core i7-930 @ 3.8GHz; Motherboard: MSI X58A-GD65 (Intel X58); GPU: Zotac GeForce GTX 480 (3x, 3-way SLI); RAM: 6GB Patriot Viper II DDR3-2000; Storage: 64GB Crucial RealSSD C300 (2x; RAID 0), 1TB Hitachi Deskstar (2x, RAID 0); PSU: Corsair HX1000W; ODD: 10x Blu-ray reader and DVD-RW combo drive; OS: Windows 7 Ultimate (64-bit)

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Velocity Micro Edge Z55

In this roundup, it's easy to consider Velocity Micro's Edge Z55 the "value" system, especially in light of the pimped out Overdrive PC BigBlock GTR (Velocity Micro is OPC's parent company) and the stratospherically-spec'd Velocity Micro Raptor Signature Edition. But don't underestimate it for a second. The Gx2-W solid aluminum chassis looks nearly identical to that of the Raptor, save the front panel, which favors individual optical drive bay doors to maintain the neutral unified appearance. There's a media reader and large back-lit slotted grille in the front of the system. The side panel features a large window that provides a good view of the sparse-looking interior. Remarking on the interior of the Edge Z55, another contributor to this article, Seth Colaner, said it looks like a serial killer's apartment. The same meticulous wiring you'll see in the Raptor and BigBlock GTR is on display here, as well, at no extra charge.

With the side panel off, the first thing we noticed was the same GPU fan that the Raptor has, but this one is relieving a pair of Evga GeForce GTX 470s in SLI. The processor here is the Intel Core i7-970, and the CoolIT Systems ECO A.L.C. (Advanced Liquid Cooler) helped Velocity Micro crank the core speed from 3.2GHz to 4GHz. Velocity certainly didn't skimp when it came to the motherboard: Here you'll find the same Evga X58 FTW3 board featured in many of the more pricey systems.

Velocity Micro installed 6GB Patriot Viper II DDR3-1600 memory and relied on two 1TB Western Digital Caviar Black hard drives in a RAID 0 array for the OS and everything else you want to load up on this system. The optical drive installed in the topmost 5.25-inch bay is an LG WH10LS30 Super Multi Blue Blu-ray Writer, which should handle all the media formats you use. The PSU powering it all is a 1,200-watt unit from Velocity Micro.

Compared to other systems in the same tier, the Velocity Micro Edge Z55's composite score tied for fourth place with CyberPower's Gamer Xtreme XT-K. Among its similarly priced fellows, this system shined in Sandra's Processor Arithmetic and Multi-Media tests and the CPU-centric portion of 3DMark Vantage. It's no slouch in gaming either, ranking third out of seven Tier I systems in Left 4 Dead 2 and Aliens vs. Predator. Although The Edge Z55 didn't show up in the overall rankings, it is a solidly built system that we'd be proud to call our own. ▲

Edge Z55
$3,499
Velocity Micro
www.velocitymicro.com

Specs: Intel Core i7-970 @ 4GHz; Motherboard: Evga X58 FTW3 (Intel X58); GPUs: Nvidia GeForce GTX 470 (2x, SLI); RAM: 6GB Patriot Viper II DDR3-1600; Storage: 1TB Western Digital Caviar Black (2x; RAID 0); ODD: LG WH10LS30 Super Multi Blue Blu-ray Writer; PSU: Top Power 1,200W

CyberPower Xtreme XLC

Initially, I was surprised to see Cooler Master's HAF (high airflow) X case combined with an XSPC watercooling kit that was running through the CPU and three GeForce GTX 480 graphics cards, because I imagined the HAF X's design would best suit air-cooled components. But liquid-cooling radiators need plenty of air, too, and CyberPower took advantage of the HAF X's 230mm top fans to pull heat from the XSPC 360mm radiator, which also had three 120mm fans attached to the underside that further help to push heat out of the radiator. The Xtreme XLC's single cooling loop helped CyberPower reach a 4.4GHz clock speed on the Intel Core i7-980X and keep all three Evga 480 Hydro Copper FTW graphics cards cool.

The exterior of the Xtreme XLC is fairly plain, as the only visible modifications to the stock HAF X are the fan controls at the front of the system, the visible liquid-cooling block, and the clear side-panel window. Bright red LEDs in the 120mm rear exhaust fan and the blue LEDs in the memory cooler make the system components clearly visible through the side-panel windows. You can also clearly see the glowing Republic of Gamers logo on the Asus Rampage III Extreme motherboard. Any cables not run behind the motherboard were zip-tied together to maintain a neat appearance.

The Xtreme XLC sent to us featured hardware that's top-notch, as are CyberPower's overclocks. It's no small feat to push the Core i7-980X up to 4.4GHz. CyberPower opted to let Evga handle the GPU overclocking: The GeForce GTX 480 Hydro Copper graphics cards' factory-overclocked settings are unchanged. We like that CyberPower opted to create a RAID 0 configuration using two 160GB Intel X-25M's, as opposed to one with lower-capacity SSDs, to give us plenty of room to install games and applications. A 2TB RAID 1 setup for a storage drive is also handy for protecting our media.

Among the Tier II systems, CyberPower's Xtreme XLC produced the highest frames per second in all three of our gaming benchmarks. It was also in the top three in nearly every other test—highlights include a 27700 Overall Score in 3DMark Vantage (second among Tier II PCs), 11.28 points in Cinebench 11.5 (third), 26Gbps in Sandra 2010's Memory Bandwidth (second), and 513MBps in Sandra 2010's Physical Disk test (first). In short, the Xtreme XLC did well on all our gaming and synthetic benchmarks.

If performance per dollar is your goal, CyberPower's Xtreme XLC is your system. We also like that Xtreme XLC delivered high scores in all our benchmarks, so the Xtreme XLC works as well with practical tasks as it does when gaming. The exterior side-panel window and internal LEDs give you a way to showcase the powerful hardware to friends. ▲

Xtreme XLC
$6,499
CyberPower
www.cyperpowerpc.com

Specs: CPU: Intel Core i7-980X @ 4.4GHz; Motherboard: Asus Rampage III Extreme (Intel X58); GPU: Evga GeForce GTX 480 Hydro Copper (3x, 3-way SLI); RAM: 12GB Kingston HyperX DDR3-1800; Storage: 160GB Intel X-25M (2x, RAID 0), 2TB Hitachi Deskstar (2x, RAID 1); ODD: LG CH10LS20; PSU: Silverstone SST-ST1500; OS: Windows 7 Home Premium (64-bit)

iBuyPower Level 10

Imagine filling Thermaltake's Level 10 case with today's highest-performing components, setting up RAID configurations, and adding all the connectivity features you can think of. The result is iBuyPower's Level 10 dream PC submission. iBuyPower tells us that the Level 10's cooling capabilities allowed them to produce a system built for long-term reliability, stability, and quality.

The compartmental design of the Level 10 case makes it a very quiet system; iBuyPower further lowered noise levels by installing Enermax fans with high-performance magnetic bearings. The iBuyPower Level 10 was nearly silent, even during our intensive gaming benchmarks. There's not much glitz on the outside of the case, but inclusion of Creative's Sound Blaster X-Fi Titanium Fatal1ty Champion Series sound controller and a 12-in-1 memory card reader draw your attention to the top compartment. Since all the components are hidden in compartments, there's no need for any fancy lighting. To make the interior clean, iBuyPower replaced the system's visible power cables with extensions made of individually wrapped wires. The all-black, mesh-sheathed cables add a touch of class to the inside of the case.

Inside the motherboard compartment, iBuyPower installed an Intel Core i7-980X. For graphics power, the Level 10 sent to us featured dual ATI Radeon HD 5970s in CrossFire. iBuyPower shipped the cards in a separate box to keep them safe during the shipping process. Power users will also appreciate the 12GB of Kingston HyperX DDR3-1600 memory, and an OS drive that consists of two 128GB Kingston SSDNow! VSeries in RAID 0. Your personal data can be stored on the two 2TB Seagate Barracudas that are set up in RAID 1 to provide redundancy. A 1,200-watt Thermaltake power supply and 10X BD-ROM/DVD burner combo drive round out the system.

The lack of a CPU overclock, due to iBuyPower's focus on reliability, and the inclusion of Radeon HD5970s as opposed to GTX 480s in 3-way SLI, put the Level 10 benchmarks behind many of the Tier II dream PCs. That being said, the Level 10 comes in around $500 to $1,000 less than most of the competition. One test where the Level 10 excelled was 3DMark Vantage, where it delivered an overall score of 24736, a GPU score of 24348, and a CPU score of 35480. The Level 10 also produced an impressive speed of 333.12MBps in the Sandra 2010's Physical Disk test.

We have no doubt that iBuyPower's Level 10 is a well-designed build, but we'd have liked to see iBuyPower customize the exterior of the PC to match the quality parts hidden inside. Imagine how imposing the Level 10 would look with some artwork on the side panels or a clear panel that shows off its high-end components.

Nevertheless, the focus on reliability and stability is something that people wanting a well-rounded gaming machine should take into consideration. ▲

Level 10
$5,999
iBuyPower
www.ibuypower.com

Specs: CPU: Intel Core i7-980X @ 3.33GHz; Motherboard: Gigabyte X58A-UD7 (Intel X58); GPU: Sapphire 5970 (2x, CrossFire); RAM: 12GB Kingston HyperX DDR3-1600; Storage: 128GB Kingston SSDNow VSeries (2x, RAID 0), 2TB Seagate Barracuda (2x, RAID 1); ODD: LG CH10LS20 BD Combo; PSU: Thermaltake TR2 TRX-1200; OS: Windows 7 Home Premium (64-bit)

PSU MYTHS

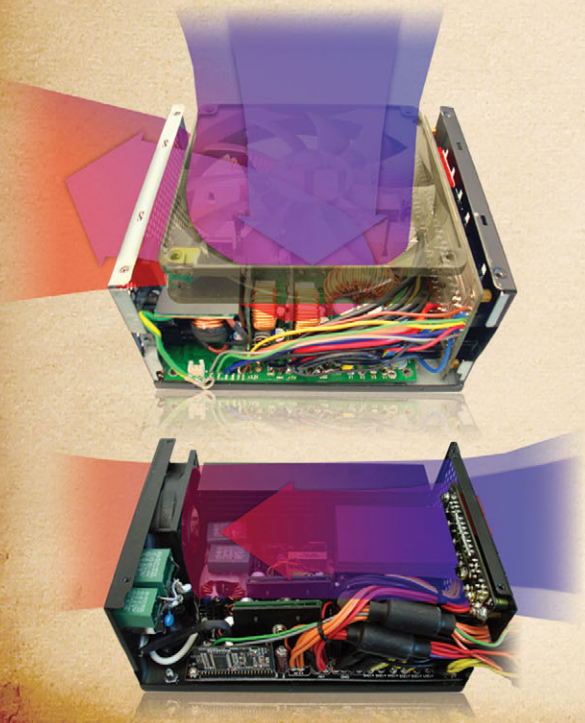
BUSTED

MYTH 4: Larger Fans Are Better Than Smaller Fans

NO! Basing fan effectiveness solely on fan size is an inaccurate assessment. In reality, there are a number of factors involved, a few of which are discussed below.

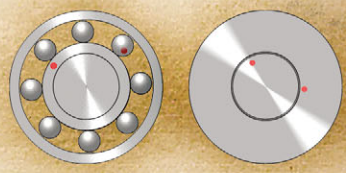
Fan and PSU design impact PSU performance.

Larger PSU fans are almost always mounted at the top of a PSU's casing. Airflow in this type of configuration is diverted by 90 degrees before it can exit the power supply, which creates turbulence and in turn dramatically reduces cooling efficiency. Smaller PSU fans tend to be used in horizontal *pull* or *push-pull* configurations where the fans are mounted in the back of the PSU. This allows air to travel unimpeded through the PSU's casing, thus increasing cooling effectiveness.



The type of bearing used is very important.

The two most common types of bearings used in PSU fans are sleeve bearings, which use two lubricated surfaces that rub together, and ball bearings, which use metal spheres that roll between the two surfaces. Sleeve bearings tend to have higher friction (thus generating more heat) and a shorter lifespan than ball bearings.



Ball bearing Sleeve bearing

Higher temperatures reduce the lifespan of PSU components.

For example, if a PSU's lifespan is specified at 25 degrees C, that lifespan is cut in half with every additional 10 degrees C. The challenge is to strike a balance between optimizing cooling and minimizing noise.

Pulse Width Modulation (PWM) fans, featured on select Antec PSUs, are able to efficiently cool PSU components while decreasing rpm to a level that virtually eliminates noise. In fact, the noise produced by a PWM 80mm fan at low CFM is comparable to that of a larger 120mm fan.

Ultimately, whether a small or large fan is better depends upon a complex set of factors and is not as simple as just saying one size is better than the other. ■

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Antec

Origin Genesis

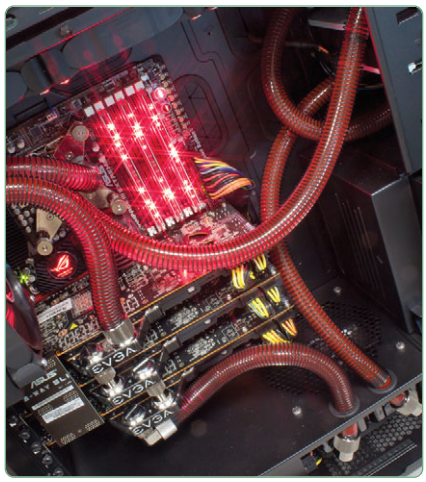
Although a tier down pricewise from Origin's other Dream PC entry, the Big O, the Origin Genesis is hardly a compromise.

The Corsair Obsidian 800D case is steel, with one large clear window in the side panel so you can gaze at your killer components while they work. As with many of our Dream PC cases this time around, it's an understated black case, but with a bit of panache, such as the brushed aluminum front panel, spring-loaded doors for the ODD and front-loading HDD bays, and the four Lamptron FC3 fan controller knobs.

Inside, the cabling is nice and tidy, with everything neatly tucked away out of sight, and the red liquid-cooling tubes with black rings add a bit of eye candy.

As with all Origin PCs, if there's a part you want for your custom build that Origin doesn't have, the builder will go get it, but you probably won't want much more than what's already inside. The six-core Intel Core i7-980X is overclocked to 4.38GHz on this particular build (with Turbo Boost, it scales up to 4.52GHz). Origin filled the graphics and memory order in triplicate, with triple GeForce GTX 480 Hydro Copper FTW graphics cards and three 2GB sticks of Crucial DDR3-1600 memory.

A pair of 50GB OCZ Vertex 2 SSDs in a RAID 0 configuration provide a quick OS volume, and the two 1.5TB WD Caviar Black hard drives combine to offer 3TB of storage. A 12X Blu-ray player and 40-in-1 media card reader round out the list of media components.



The best way to describe the Genesis' performance in testing is "consistent." Although other systems in its tier had a noticeable spike or dip in this or that score, this system was at or near the top in each test. It didn't blow away the competition, but it most certainly wasn't outgunned, either.

If the price tag of the Big O system is a little steep for you but you like the Origin brand and craftsmanship, the Genesis will make you very happy. It's less flashy than its big brother, far more affordable at $6,951 (as configured), but still packs a wallop. ▲

Genesis
$6,951
Origin
www.originpc.com

Specs: CPU: Intel Core i7-980X @ 4.38GHz; Motherboard: Asus Rampage III Extreme (Intel X58); GPU: Evga GeForce GTX 480 Hydro Copper FTW (3x, 3-way SLI); RAM: 6GB Crucial Ballistix Tracer DDR3-1600; Storage: 50GB OCZ Vertex 2 (2x, RAID 0), 1.5TB Western Digital Caviar Black (2x, RAID 0); PSU: Silverstone Strider 1500W; ODD: Pioneer BDR-205BK; OS: Windows 7 Home Premium (64-bit)

Overdrive PC BigBlock GTR

Overdrive PC has gained a reputation for thinking outside the box when it comes to component choices, and that thinking garnered OPC top marks in games two years ago when it was the lone builder to send us a dual-core CPU. This year, OPC sent us a refresh of the BigBlock GTR in an unpainted black anodized aluminum Lian-Li case (built custom for OPC), though painted exteriors are available starting at $345. This case (with the wheel-kit option) is the same one OPC has used for the previous BigBlock GTRs we've tested, so there's nothing new here. The predominant feature of this case is a spacious and simple interior that lets the builder banish any and all things hot and ugly, including the system heat, the PSU, wires, and data cables. OPC also made silence a priority here with sound-dampening material on both side panels and a pair of low-velocity blue LED-lit fans in lieu of a window.

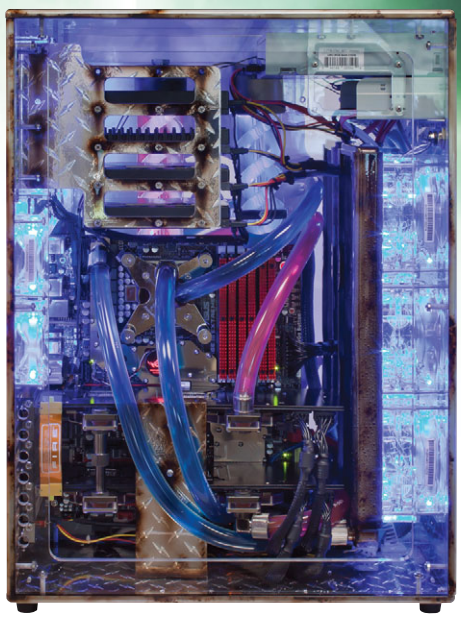
Forgoing the phase-change cooler of last year's model in favor of CoolIT Systems Vantage A.L.C. (Advanced Liquid Cooler), OPC was able to "Hyper-Clock" the Intel Core i7-980X inside the BigBlock GTR to 4.3GHz. Evga's X58 FTW3 motherboard is the foundation of the system, to which OPC added three Evga GeForce GTX 480s in Tri-SLI and a whopping 12GB of Patriot DDR3-1600 memory.

Another feature OPC carried over from last year to this is the modular hot-swappable HDD bay that resides where you typically find the top three 5.25-inch optical drives. The first two slots are occupied by a pair of 128GB Adata S599 SSDs inside Icy Dock enclosures and configured in a RAID 0 array. A second pair of bays houses a couple of 2TB Hitachi Deskstar 7K2000 drives in a RAID 0 array, which quickens any storage-centric operations you'll perform. OPC installed two optical drives in the BigBlock GTR, an LG WH10LS30 Super Multi Blue Blu-ray Writer and an LG GH22NS50 DVD±RW drive, which let you write and read whatever disc format you throw at it. The power supply feeding this beast is a 1,500-watt Velocity Micro-branded unit.

The OPC BigBlock GTR performed admirably in our benchmarks, snagging the No. 2 spot in Futuremark's PCMark Vantage among all systems tested and the No. 1 spot for that suite among Tier II systems. It also garnered the third-best performance in Left 4 Dead 2 and Aliens vs. Predator when compared to other Tier II systems. Although the BigBlock GTR's performance didn't blow us away, it did score better than average overall. ▲

BigBlock GTR
$6,799
Overdrive PC
www.overdrivepc.com

Specs: Intel Core i7-980X Extreme Edition @ 4.3GHz; Motherboard: Evga X58 FTW3 (Intel X58); GPUs: Nvidia GeForce GTX 480 (3x, 3-way SLI); RAM: 12GB Patriot DDR3-1600 Premium Memory; Storage: 128GB Adata S599 SSDs (2x; RAID 0), 2TB Hitachi Deskstar 7K2000 (2x; RAID 0); ODDs: LG WH10LS30 Super Multi Blue Blu-ray Writer, LG GH22NS50 DVD±RW; PSU: Top Power 1,500W



Smooth Creations Goliath Extreme

If the Battlefield Prophet was Smooth Creations' appetizer, then the Goliath Extreme is the main course and dessert all rolled into one very large and eye-pleasing package. Smooth Creations is where PCs meet art, and adorned with a hand-painted and airbrushed "Gear Driven" theme, this system doesn't have an ugly side to it. In fact, we had a hard time deciding our favorite angle.

By boldly utilizing Danger Den's clear acrylic Double Wide Tower 21, Smooth Creations left itself very few places to hide wires. Even the systems we single out as having some of the best wiring jobs are ugly as sin when you take off the second side panel, but here the wiring is very inconspicuous. Smooth Creations also strategically applied diamond board decals and airbrushed rust accents to some of the interior components and frame, which gives the system the decrepit industrial look so common to videogame settings. This builder prides itself on having an in-house paint shop and design team, as they should; it is unparalleled.

If the paint job is the best thing about a Smooth Creations system, then elaborate liquid-cooling systems are the second-best thing. Here you'll find an Intel Core i7-980X Extreme Edition CPU overclocked to 4.5GHz, the X58-based Asus Rampage III Extreme, and two ATI Radeon HD 5970 graphics cards in CrossFireX, all liquid-cooled by a massive dual-loop system, with components courtesy of Koolance. The CPU and chipset are running blue liquid, and the graphics cards are running pink. Both loops draw from twin twisting reservoirs mounted behind the motherboard. Two massive radiators on the front of the case cool the liquid with the help of a bank of six 120mm fans. The back side of the system has a further seven fans.

For the system memory, Smooth Creations installed 12GB Corsair Dominator GT DDR3-2000. The storage array consists of a pair of 256GB Western Digital SiliconEdge Blue SSDs in RAID 0 and two 2TB Western Digital Caviar Green hard drives. Other highlights include an AeroCool V12XT touchscreen fan controller, a multiformat media reader, a Lite-On DH-4B1S Blu-ray Disc Triple Writer, and a Corsair Professional Series Gold AX1200 power supply.

In the benchmarks, the Goliath Extreme achieved the No. 3 spot for Cinebench, POV-Ray, and all of Sandra's tests save the HDD-based test, largely thanks to the Core i7-980X's impressive 4.5GHz overclock. Compared to other systems within Tier II, the Goliath Extreme dominated any test that relied heavily on the CPU. The Smooth Creations Goliath Extreme is one of those rare circumstances where beauty and brains come standard. ▲

Goliath Extreme
$6,990
Smooth Creations
www.smoothcreations.com

Specs: Intel Core i7-980X Extreme Edition @ 4.5GHz; Motherboard: Asus Rampage III Extreme (Intel X58); GPUs: ATI Radeon HD 5970 2GB (2x, CrossFireX); RAM: 12GB Corsair Dominator GT DDR3-2,000; HDDs: 256GB Western Digital SiliconEdge Blue SSD (2x, RAID 0), 2TB Western Digital Caviar Green (2x); ODDs: Lite-On DH-4B1S Blu-ray Disc Triple Writer; PSU: Corsair Professional Series Gold AX1200

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AVA Direct Custom Gaming PC

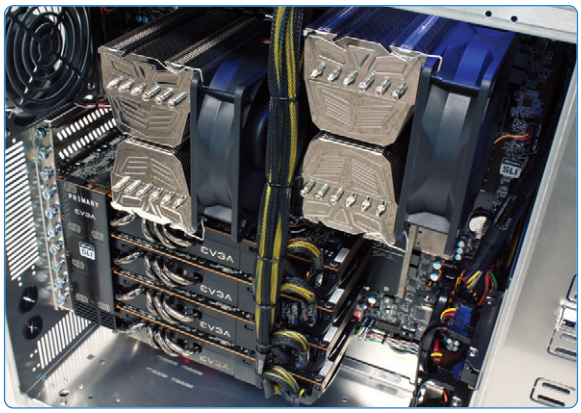
AVA Direct's Custom Gaming PC was a pleasant surprise. Although we assumed the builder's submission would be solid, this system was a real hoss.

The Lian Li Armorsuit PC-P80 case is rather plain, but it's nevertheless stately with an all-black brushed aluminum exterior. When you pop open the side panel, though, the unpainted aluminum interior, crisp cabling, and black and chrome color scheme with yellow highlights of the components and cables (how'd they do that?) make it seem as though you're looking into the chest cavity of a fastidious Terminator.

The front panel, which houses a fan speed controller knob, opens to reveal the LG 10X Blu-ray player and Samsung Super-WriteMaster 24X DVD player/burner, as well as the 75-in-1 Rosewill RCR-IM5001 media card reader.

The dual Intel Xeon X5680s, Quad-SLI Evga GTX 480s, and 12GB of RAM blasted through most of our benchmarks; the storage configuration, however, hamstrung the system. The Custom Gaming PC has four 2TB Seagate Barracuda XTs for an unbelievable amount of storage, but the lack of an SSD for the OS volume delivered relatively paltry PCMark Vantage and SiSoft Sandra Physical Disk scores. We were also a little surprised that the CPUs weren't overclocked and that there was no liquid-cooling system.

The AVA Direct system boasted high scores in 3DMark Vantage, SiSoft Sandra's Memory tests, and all three gaming benchmarks, taking the top score in Aliens vs. Predator at 82.3fps.



We had to disable Hyper-Threading for 3DMark Vantage and PCMark, because the system's 24 threads outpaced the 16 threads supported by those benchmarks. Futuremark tells us that the system's scores would not be markedly affected by disabling Hyper-Threading and also that support for more than 16 threads is coming soon.

As part of the package deal, you also get a three-button Kingwin 3D optical mouse (800dpi), Microsoft Wired Keyboard 200, and Napoleon: Total War.

Although a bit understated on its face, the AVA Direct Custom PC Gaming system is a raging beast of speed and power. We'd like to see a few more tweaks to get the most out of the system's considerable capabilities, but, then again, that could bump the price past the $10,000 mark. ▲

Custom Gaming PC
$9,224.94
AVA Direct
www.avadirect.com

Specs: CPU: Dual Intel Xeon X5680 @ 3.33GHz; Motherboard: Evga SR-2 (Intel 5520); GPU: Evga GeForce GTX 480 SuperClocked (4x, 4-way SLI); RAM: 12GB Mushkin Blackline DDR3-1600; Storage: 2TB Seagate Barracuda XT (4x, RAID 10); PSU: Silverstone Strider 1500W; ODDs: LG WH10LS30, Samsung SH-S243N; OS: Windows 7 Ultimate (64-bit)

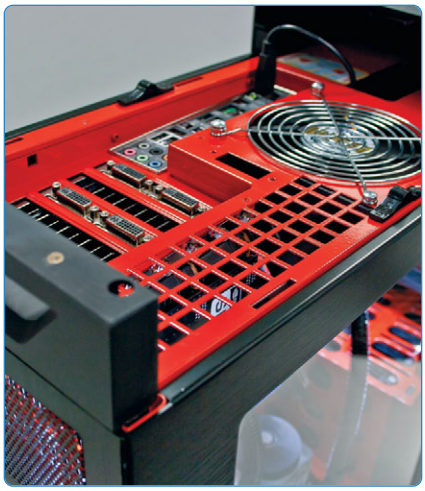
Maingear Shift

We've learned to expect Maingear to send us a competent performer with that extra bit of polish that only comes with deep experience. Maingear's offering this year is no different; it's called the Shift, and ours came with the SuperStock options.

Let us be clear: The case used for the Shift is beautiful. Maingear tells us that Silverstone makes it for them custom (sadly, Silverstone will not sell you one), which is a departure from the staid Silverstone TJ10 they used for the Ephex they sent us the two previous years. The slick case features brushed black anodized aluminum with thick front and back panels, a wedge-shaped beveled top panel with a unique offset rectangle aesthetic, and a windowed side panel that provides a view of the unconventional interior. If you're familiar with Silverstone's Raven, then you'll recognize the 90-degree motherboard layout, which lets heat rise more naturally past the graphics cards for a cooler and more component-friendly environment.

Inside, Maingear applied "Pursuit Red" paint to the frame and interior and lit everything with revealing white LEDs. The Maingear X120 liquid-cooling system, with two radiators, a reservoir etched with Maingear's logo, and a Koolance CPU block, keeps temperatures manageable for the Asus Rampage III Extreme and the Intel Core i7-980X processor, the latter of which is overclocked to 4.36GHz. Maingear left the trio of Evga GeForce GTX 480s to air cooling. The system also features 6GB of Kingston HyperX DDR3-2000 memory and a storage array that consists of two 256GB Crucial RealSSD C300s in RAID 0 and a 2TB Western Digital Caviar Black HDD for media. Powering everything is a 1,500-watt Silverstone Strider PSU.

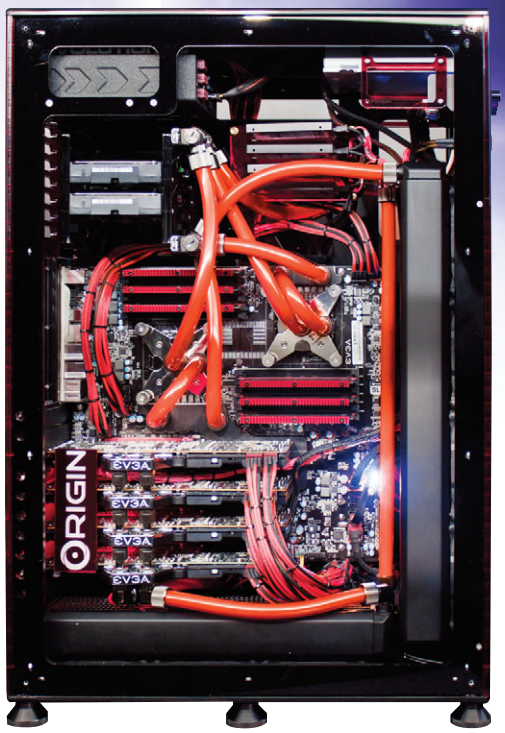
A pair of optical drives will handle reading and writing for BD, DVD, and CD formats, and a top panel-mounted media reader covers pretty much every popular media format. This dream machine also came with three 3D Vision-capable 23-inch Asus displays and matching Nvidia 3D Vision glasses, which literally add a new dimension to gaming experiences and another $2,000 to the price of the Shift that we tested. The Shift SuperStock ships with lifetime service labor and phone support and a three-year hardware warranty.



The Shift achieved the second-best memory bandwidth score overall in Sandra. In CPU-centric benchmarks and the games, the Shift ranked third of the four Tier III systems. The Shift ranked fourth overall in Aliens vs. Predator and Left 4 Dead 2, and seventh overall in S.T.A.L.K.E.R.: Call of Pripyat. The enthusiast community has come to expect to be impressed by this storied builder, and the Shift certainly scores big on aesthetics and build quality, if slightly less so in the performance category. ▲

Shift
$7,995
Maingear
www.maingear.com

Specs: Intel Core i7-980X Extreme Edition @ 4.36GHz; Motherboard: Asus Rampage III Extreme (Intel X58); GPUs: Nvidia GeForce GTX 480 (3x, 3-way SLI); RAM: 6GB Kingston HyperX DDR3-2000; Storage: 256GB Crucial RealSSD C300 SSDs (2x; RAID 0), 2TB Western Digital Caviar Black; ODDs: LG WH10LS20 Super Multi Blue Blu-ray Writer, Lite-On iHAS424 DVD±RW; PSU: Silverstone Strider 1,500W



Origin Big O

The "O" in Origin's Big O system may as well stand for "Oh my gosh, that computer is a beast!" This double-wide tank is easily one of the fastest, most powerful consumer PCs available.

The case is a customized Danger Den Tower 29 designed to show off the Big O's internals. Its side panels are made of clear acrylic, while the front and back panels are a translucent red aside from the custom nameplate adorning the front. The liquid-cooling system is green and burnt orange and well-made, with nary a hint of kinking to be found.

The Big O sports a pair of overclocked six-core Intel Xeon X5680 processors, 12GB of RAM, and four Evga GTX 480 graphics cards. It burned through the Left 4 Dead 2 benchmark at an incredible 200.87fps. In other words, yes, it can run Crysis.

The OS drive consists of four 50GB OCZ Vertex 2 SSDs in RAID 0, and the two 2TB WD Caviar Black drives supply more than ample storage. Other goodies include a Pioneer 12X Blu-ray player and a Rosewill media card reader.

Origin went above and beyond by integrating a liquid-cooled Xbox 360 into the case. Origin didn't just buy an Xbox 360 and cram it in there, though. The builder disassembled the Xbox and then mounted the various ports in logical places, so the front ports are accessible from the front of the case while the rear ones are seated nicely in the back. And because it runs separately from the Big O's computer components, you can game on the Xbox while the computer itself is performing other operations.

Origin wants to position the Big O as the ultimate everything computer,

including the consummate HTPC. It's not exactly going to fit in your living room, but if you're dropping almost $17,000 on it, chances are your home has a mighty fine dedicated entertainment room.

The Big O rocked our benchmarks, taking top scores overall for 3DMark Vantage, Cinebench 11.5, POV-Ray 3.7 Beta, and most of the SiSoft Sandra scores (by a long shot), but it's worth noting that we had to disable Hyper-Threading in order for 3DMark Vantage and PCMark Vantage to run properly, as the two benchmarks currently only support 16 threads. The good folks at Futuremark note that by virtue of the benchmark design this wouldn't appreciably affect the scores, though, and support for more threads is forthcoming.

If you want the ultimate PC, the Big O is it. Good luck finding an application or set of processes that can completely max out this system. ▲

Big O
$16,999
Origin
www.originpc.com

Specs: CPU: Dual Intel Xeon X5680 @ 4.3GHz; Motherboard: Evga SR2 (Intel 5520); GPU: Evga GTX 480 Hydro Copper FTW (4x, 4-way SLI); RAM: 12GB Corsair GT DDR3-2000; Storage: 50GB OCZ Vertex2 (4x; RAID 0), 2TB Western Digital Caviar Black (2x); PSU: Enermax Revolution85+ ERV1050EWT(2x); ODD: Pioneer BDR-205BK; OS: Windows 7 Ultimate (64-bit)

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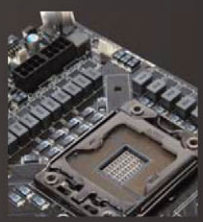
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Video	6x PCI-Express x16 slots Support NVIDIA SLI & ATI CrossFireX
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Velocity Micro Raptor Signature Edition

Velocity Micro is Overdrive PC's parent company, so much of the design philosophy we saw in the BigBlock GTR is also apparent in the Raptor Signature Edition. Having seen this PC in previous Dream PC roundups, we were not surprised when we opened the box to find the refresh comes in the same modified Velocity Micro Flagship LXe-W case, which is a thick-walled aluminum case from Lian-Li that dissipates heat like a heatsink. The bare aluminum silver finish puts the focus on the large, windowed side panel. Clean straight lines characterize the case exterior and dual-door front panel, while just a single tidy column of wires snakes from the graphics cards to the 24-pin ATX power connector up and into the shadows where the PSU lurks. You can tell, looking through the window at the Raptor Signature Edition's guts, the guys who assembled this know what they're doing.

With the side panel off, you'll find an LED-lit GPU fan designed to help move heat away from the hottest part of the system, a trio of Nvidia GeForce GTX 480s in 3-way SLI. The CPU in this system is the Intel Core i7-980X, which Velocity Micro cools with CoolIT Systems' ECO A.L.C. (Advanced Liquid Cooling) integrated waterblock and pump module. With the device, the builder managed to achieve a "HyperClock" of 4.2GHz. The MSI Big Bang XPower motherboard is the core of the Raptor, and Velocity Micro took a decidedly workstation approach to the system by saddling it with an unheard of 24GB of Patriot Viper II DDR3-1600 memory.

The front panel, hidden behind a door that shields the top two-thirds of the front of the case, features a pair of LG WH10LS30 Super Multi Blue Blu-ray Writer optical drives and an all-in-one media reader. The lower front panel door conceals a large fan that relieves the internal HDD bay. The storage subsystem of the Raptor consists of an impressive four 128GB ADATA S599 SSDs in a RAID 0 array and a 2TB Hitachi Deskstar 7K2000 drive. The PSU powering it all is a 1,500W Velocity Micro-branded model.

Compared to other systems in its price tier and overall, the Raptor Signature Edition achieved second and first place in Sandra's HDD test and Futuremark's PCMark Vantage, respectively. Consider, though, the Raptor scored those wins while competing against two systems equipped with dual Xeon CPUs and Quad-SLI graphics subsystems. Although it's not in the same league as some of the other top systems, it does outperform most systems here, and its build quality is among the best we saw. ▲

Raptor Signature Edition
$7,899
Velocity Micro
www.velocitymicro.com

Specs: Intel Core i7-980X Extreme Edition @ 4.2GHz; Motherboard: MSI Big Bang XPower (Intel X58); GPUs: Nvidia GeForce GTX 480 (3x, 3-way SLI); RAM: 24GB Patriot Viper II DDR3-1600; Storage: 128GB ADATA S599 SSDs (4x; RAID 0), 2TB Hitachi Deskstar 7K2000; ODDs: LG WH10LS30 Super Multi Blue Blu-ray Writer (2x); PSU: Top Power 1,500W

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By The Numbers

We ran each system through our set of real-world and synthetic benchmarks, which gives you an idea of how the PCs would do with your power user tasks and applications. For example, if a PC got top scores in SiSoftware Sandra 2010 Lite but lower scores in our game tests and 3DMark Vantage, it'll be more of an all-around performer than an extreme gamer. Of course, relatively speaking, none of these systems should leave you wanting in any application.

	CyberPower Gamer Xtreme XT-K	Digital Storm Black OPS Assassin Edition	iBuyPower Paladin XLC	Puget Serenity Mini	Smooth Creations Battlefield Prophet	V3 Gaming Avenger	Velocity Micro Edge Z55	CyberPower Gamer Xtreme XLC	iBuyPower Level 10	Origin Genesis
CATEGORY	**TIER I ($0 - $3,500)**							**TIER II ($3,501 - $7,000)**		
Price	$2,999	$3,226	$3,499	$2,444	$3,150	$3,499	$3,499	$6,499	$5,999	$6,951
Warranty (parts/support; years)	**1/Lifetime**	**1/Lifetime**	**3/Lifetime**	**1/Lifetime**	**1/Lifetime**	**3/Lifetime**	**1/1**	**1/Lifetime**	**3/Lifetime**	**1/Lifetime**
3DMark Vantage Extreme	**1,920 x 1,200**							**1,920 x 1,200**		
Overall Score	24149	19055	16134	13132	13290	24382	16623	27700	24736	27997
GPU Score	24189	18831	15670	11923	13059	24414	16163	27265	24348	27550
GPU1 (fps)	75.74	58.88	51.22	34.77	42.07	73.66	51.14	82.61	76.23	83.56
GPU2 (fps)	65.8	51.31	40.44	29.72	34.31	69.3	43.42	77.02	66.24	77.74
CPU Score	23416	24612	36843	22585	19996	23778	36171	39779	35480	40454
CPU1 (Plans/s)	3284.52	3451.05	5193.71	3158.19	2570.82	3360.19	5081.52	5559.93	5022.02	5720.61
CPU2 (Steps/s)	29.92	31.31	45.83	29.11	31.43	29.76	46.03	51.33	44.21	50.54
PCMark Vantage Pro 1.1	**1,600 x 1,200**							**1,600 x 1,200**		
Overall	17683	14129	12121	12589	13096	17910	13875	24015	18502	24422
Memories	11681	10903	10976	8968	10162	12852	8545	13704	19422	13885
TV And Movies	6581	6476	7973	6030	6056	7124	7038	8417	7952	8535
Gaming	21797	17887	17646	16625	15033	21812	10804	24750	19234	23437
Music	19722	10207	16575	17155	16493	19204	11377	23674	15781	23587
Communications	13113	11693	11011	10293	12228	13088	16312	24054	12782	24585
Productivity	22705	18187	17162	19305	17536	24102	10902	30973	16455	27601
HDD	29609	15441	14868	25619	21996	35994	6582	47734	14277	41478
Cinebench 11.5 CPU (points)	6.55	6.93	10.32	6.3	7.03	6.62	10.11	11.28	9.82	11.3
POV-Ray 3.7 Beta (pixels/s)	4971.63	5234.92	7707.17	4772.5	5690.49	4946.77	7697.67	8444.27	7402.69	8406.36
SiSoft Sandra 2010 Lite										
Processor Arithmetic										
Dhrystone iSSE4.2 (GIPS)	110	117.83	171.73	106.2	94.63	112	172.5	188	139.25	193.85
Whetstone iSSE3 (GFLOPS)	73.55	83.83	125.22	71	69.83	79.12	125	137.42	100.71	136.81
Processor Multi-Media										
Integer x16 iSSE4.1 (Mpixels/s)	208.58	217.7	324.23	201	281	207.38	323.89	355.25	261.13	357
Floating Point x8 iSSE2 (Mpixels/s)	155.17	162.25	242.51	149.59	169.16	154.33	242.75	266.48	195.79	265.64
Double x4 iSSE2 (Mpixels/s)	84.28	88	132	81.35	93.45	83.5	131.66	144.72	106.23	144
Memory Bandwidth										
Integer Buffered iSSE2 (GBps)	19.8	25	21.82	15.27	12.4	13.74	19.5	26	22	25.27
Floating Point Buffered iSSE2 (GBps)	19.85	25	21.82	15.3	12.4	13.75	19.63	26	21.8	25.31
Physical Disks										
Drive Score (MB/s on OS drive)	224.32	249.18	360.41	243.3	225.9	526.32	201.3	513	333.12	430.55
Games	**2,560 x 1,600**							**2,560 x 1,600**		
Left 4 Dead 2 (8X MSAA, 16XAF)	165.23	142.42	136.05	81.02	107.73	169.73	162.77	195.73	162.93	187.2
Aliens vs. Predator (8XAA)	28	44.5	32.9	36.8	28.3	61.5	39.3	66.5	28	58.4
S.T.A.L.K.E.R.: Call of Pripyat (4XAA)	23.7	62.6	44.1	9.3	22.5	59.2	35.2	93.2	67	64.5

Dream A Little Dream

This year's 16 dream PC systems accounted for $97,672 worth of high-end parts and boutique builders' expert labor. And if you think those numbers are eye-opening, you should have seen our eyes as we benchmarked each extravagant PC. Opulence aside, "Dream PCs" is designed to let the custom builders show off what they can do using their overclocking, modding, and design expertise. This year, we provided an additional challenge by allowing them to compete within price ranges.

	Overdrive PC BigBlock GTR	Smooth Creations Goliath Extreme	AVA Direct Custom Gaming PC	Maingear Shift	Origin Big O	Velocity Micro Raptor Signature Edition
			TIER III ($7,001 AND UP)			
	$6,799	$6,990	$9,225	$7,995	$16,999	$7,899
	1/Lifetime	1/Lifetime	3/Lifetime	3/Lifetime	3/Lifetime	1/1
			1,920 x 1,200			
	19101	26359	31574	27214	34169	19059
	18597	25861	30764	26762	33452	18565
	58.45	81.58	89.17	81.87	97.61	58.42
	50.36	69.73	91.09	74.79	98.38	50.2
	39361	41576	63172	40100	57637	38571
	5580.44	5879.28	10217.2	5699.8	8179.22	5423.6
	48.81	51.94	46.68	49.36	71.28	48.96
			1,600 x 1,200			
	24741	22668	12349	23039	22428	25804
	14814	12734	7992	13863	13045	15874
	8878	8013	7962	7857	8136	9151
	25084	23170	8827	26780	19294	25014
	24583	21051	9200	22212	23365	25684
	25490	23101	14753	23480	21761	24958
	31420	23700	10490	26106	27818	33057
	56665	25642	5687	35091	37388	70084
	10.95	11.51	18.73	11.24	20.92	10.83
	8339.5	8644.2	11428.87	8381.1	15321.99	8149.47
	186.46	194.16	299	187.42	386.81	182.7
	135.6	140.8	229.63	136.46	272.82	132.56
	350	364.22	576	351.73	715.69	343
	262.4	272.18	381.5	263	530.44	256.7
	142.48	148.25	200	143.18	288.2	139.42
	24	27.22	35	27.67	20.64	24.55
	24	27.15	34.84	27.88	21	24.54
	205.8	437.27	70	316	727.9	583.35
			2,560 x 1,600			
	183.66	159.9	196.07	190.08	200.87	184.27
	47.1	27.3	82.3	65.7	77.3	46.3
	44.8	27.3	79.5	62.5	87	44.6

Among the Tier I computers, there was no clear performance champion, because the $3,500 maximum budget forced builders to focus their builds on specific capabilities. For example, the V3 Gaming Avenger and Digital Storm Black OPS Assassin were top performers in games and graphics-based benchmarks, because they opted to use GeForce GTX 480s in SLI. On the flip side, the Velocity Micro Edge Z55 and iBuyPower Paladin XLC were generally tops in processor-based benchmarks, because the builders opted to build systems with an Intel Core i7-970. For design props in Tier I, we liked the exterior of Smooth Creations Battlefield Prophet, which showcases artwork from Battlefield Bad Company 2. In interior lighting, we'll give props to Digital Storm's Black OPS Assassin for the LED light strip that illuminates the interior components in a soft white glow.

The performance kings among the Tier II systems were Origin's Genesis and CyberPower's Gamer Xtreme XLC. Both builds were among the top three in almost every benchmark. Smooth Creations' Goliath Extreme wins for best exterior in Tier II for its Gear Driven paint job that exceeded our lofty expectations of Smooth Creations.

As you might imagine, there's a *lot* to like about the Tier III systems (over $7,000). Both Origin's Big O and AVA Direct's Custom Gaming PC packed dual Intel Xeon X5680s and GeForce GTX 480s set up in 4-way SLI, which make them pretty much the fastest computers we've ever seen. The inclusion of an Xbox 360 into Origin's Big O is also noteworthy, and something that gave us great joy to test while we were benchmarking the dream PCs. An immaculate interior is pretty much a given with the Tier III systems, but Velocity Micro's Raptor Signature Edition's extreme tidiness stands above the rest. We also like the brushed metal, color matched parts, and overall classy look of AVA Direct's Custom Gaming PC. The Maingear Shift features a cool case with a vertical design that provides great airflow, and Maingear installed LED light strips to provide a glowy system interior.

We know that many, if not all, of these builds are outside the budget of the normal consumer, but keep in mind that these dream PCs are about showing off what the builder can offer. If any of the builds here intrigue you, we're sure that boutique vendor can work with you to create the customized system of your dreams. ▲

by Andrew Leibman, Nathan Lake, and Seth Colaner

The Bleeding Edge Of Software

Inside The World Of Betas

Kaspersky Rescue Disk 10.0.23.19 Beta

Kaspersky Rescue Disk 10.0.23.19 Beta
Publisher and URL: Kaspersky Labs, www.kaspersky.com
ETA: Ongoing
Why You Should Care: It's among the better virus removal bootable CDs from a reputable security vendor.

Cleaning an infected Windows computer is sometimes a catch-22: The viruses running on the infected PC can prevent antivirus software (or other cleaners) from running to clean the viruses. The classic workarounds for this problem are themselves sometimes problematic. Not all cleaning tools are compatible with Safe Mode, and removing the infected drive to scan it requires a second computer. Another workaround is a good rescue boot disc, and the Kaspersky Rescue Disk has enough good features that it's worth checking out.

Most rescue discs typically have drawbacks, too, but KRD manages to get around most of the major ones. The first is that rescue discs are usually out of date, but KRD's Linux environment has hundreds of network drivers, enabling it to get a network address and access the Internet to download the latest definition files from Kaspersky. KRD automatically mounts NTFS and FAT32 hard drives (another typical problem—many rescue discs require you to manually mount drives), so it can write the definition file to your infected hard drive for later use. And, of course, this means it can scan your Windows drives for malware.

Kaspersky's experience with the retail antivirus market shows up as two big advantages in KRD. The first is that the GUI is usable and straightforward: Select the hard drive(s) you want to scan (listed as Windows-friendly C: and D: drives as well as Linux-friendly SDA and SDB drives) and click the Scan button, and off it goes. The second is that Kaspersky is experienced at making good retail antivirus products, consistently scoring well in our tests over the years. Further proof: KRD successfully located the infected files on our test machines.

A good security product that can block and delete viruses *before* they get in is really the best way to roll, but Kaspersky Rescue Disk makes a great Plan B. ▲

by Warren Ernst

Mozilla Firefox 4.0 Beta 3

Mozilla Firefox 4 Beta 3
Publisher and URL: www.mozilla.com
ETA: Q4 2010
Why You Should Care: The best Web browser gets better and faster with age.

Once you've wrestled almost 25% of the Web browsing world away from Internet Explorer, what do you do for an encore? If you're Mozilla and your baby is Firefox, then perhaps the next step is adding some of the latest browsing technologies. This pretty much sums up what you can expect from the most recent Firefox 4 beta. This being the last beta before final release, things are quick and stable, too, meaning the beta might do a good job as your primary browser.

The first thing that leaps out at you with Firefox 4 is the new default location of the Tab Bar, which, like Google Chrome's, is now at the top of the window, just below the Title Bar. (A quick visit to the Preferences dialog box lets you move it back to its familiar location.) An Office 2007-like "Start Menu" replaces the standard Menu bar at the upper-left corner of the browser window, but this design change is also reversible.

There are several advances under the hood. The first is an optimized JavaScript engine that Mozilla claims is between 5% and 20% faster than Firefox 3.6. There's support for the HTML5 video tag and the new WebM video format, but right now there are few Web sites that actually use them. Also new is in-browser multitouch support, which allows for multitouch interaction with specific Web site elements (though the site needs special CSS coding to make the magic happen).

A surprising number of Firefox add-ons, such as AdBlock, are already compatible with Firefox 4, so even if your current Firefox installation is tricked out, you can still check out the beta and enjoy your indispensible customizations. ▲

by Warren Ernst

HOW TO BUILD THE PERFECT WATERCOOLED PC

AT PERFORMANCE-PCS.COM

EK-Supreme HF High Flow - Highest Performance CPU Water Block - Nickel/Red Plexi

- Cooling engine with fin design

Danger Den Dual Bay Black Reservoir

- Dual Inlet and Dual Outlet Options

PrimoFlex Pro LRT UV Red Tubing

- LRT (Low Radius Technology)
- Anti-Microbial

Lian Li PC-A77F Aluminum Super Tower

Bitspower Premium G1/4" Matte Black High Flow 1/2" Compression Fitting

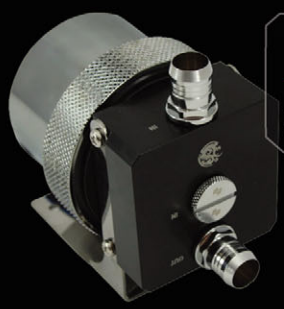
- Special Design for PC Water Cooling
- TRUE Hi-Flow

EK-FC480 GTX for Nvidia GTX 480 Reference Design - Nickel

- Full cover block for reference design GeForce 480 GTX graphic card

Danger Den Full Board Water Block for RE3

- Block effectively cools NB, SB and mosfet



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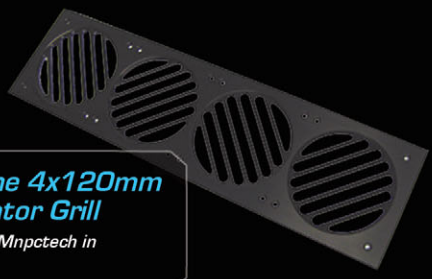
- Bitspower D5/MCP655 MOD Kit
- Koolance CTR-SPD10 Speed Control

XSPC RX480 Extreme Performance Radiator

- Dimensions: 125x58.5x534mm (WxDxH)
- 3 rows of 13mm by 2mm Tubes



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UP TO SPEED

Upgrades That'll Keep You Humming Along

A number of old favorite programs such as CCleaner, Winamp, SmartFTP, and VLC are refreshed this month. Mozilla updates Firefox as it marches toward the upcoming 4.0 release.

Software Updates

Apple iTunes 9.2.1

Hot on the heels of the iPhone 4 release and the recent 9.2 version, Apple tweaks and fixes its media library and storefront. Version 9.2.1 disables older versions of incompatible third-party plug-ins. It also corrects some small problems with dragging and dropping items.

support.apple.com

Check Point Software Technologies Zone Alarm Free Firewall 92.057.000

The Zone Alarm firewall is updated to accommodate two recent Microsoft patches to Windows 7 x64. The update also automatically detects wired or wireless network connections, improves IPv6 support, and fixes a bug that occasionally slowed Internet Explorer 8 startups.

www.zonealarm.com

Google Chrome 5.0.375.125

The increasingly popular browser plugs a series of security holes that users identified. In particular, two industrious contributors received a $1,337 reward (get it?) for creating a workaround to a Windows kernel bug. The update also fixes problems with memory corruption and memory contents being revealed in the layout code.

www.google.com/chrome

Internet Download Manager 6.01 Beta

The major revision of the venerable download manager and accelerator includes enhancements to the FLV file grabber for better direct video downloading from Web players such as YouTube, MySpace TV, Google Video, etc. This version fixes compatibility issues with Google Chrome, as well as other browsers.

www.internetdownloadmanager.com

Macecraft Software jv16 PowerTools 2010 2.0.0.963

Macecraft's longstanding tweak and system maintenance suite recently received a refresh to the new 2010 version. There are several performance-related bug fixes to the Registry Cleaner. To increase safety, the utility now skips files associated with Symantec antivirus products by default. Finally, uninstalling jv16 PowerTools should now be easier, with the inclusion of an uninstall shortcut in the directory folder.

www.macecraft.com

Mozilla Firefox 3.6.8

Another month, another incremental fix to Mozilla's browser. This version addresses a stability problem that occurred on some pages containing plug-ins. This change comes after the 3.6.7 release earlier in the month, which corrected a number of security and stability issues.

www.mozilla.com/firefox/

Nullsoft Winamp 5.58

The latest release of this classic media player revamps the app's podcast directory; the directory now boasts 30,000+ podcasts, which are updated in real time. Another big change is the addition of WebM video file format support. Version 5.58 also expands the recently added 7digital music store into Europe. Web radio stations can now embed promotional badges on their sites; when a site visitor clicks such a badge, her Winamp player will open and automatically play the associated station.

www.winamp.com

Piriform CCleaner 2.34.1200

The favorite donationware system scrubber now extends cookie cleaning to include HTML5 Web storage. The new version also improves cleaning Index.dat files, detection of install dates in the Uninstall Tool, and removal of Recycle Bin files. It also improves its support of Jump Lists and squashes a series of small bugs.

www.piriform.com/ccleaner

SmartSoft SmartFTP 4.0 Build 1133

The latest build of this popular FTP client adds an auto-link option in the Local dialog box. Build 1131 introduced the ability to link several browsers together, and build 1129 patched a drag-and-drop issue in Windows 7 that involves moving items from the Temporary Queue to the Local Browser.

www.smartftp.com

VideoLAN VLC 1.1.1

The compact and extremely format-friendly media player receives an incremental fix for the recent larger 1.1 update, which notably added GPU decoding in Win7 and Vista, using DxVA (DirectX Video Acceleration) for H.264, VC-1, and MPEG-2. The 1.1 release also added support for several codecs, including Blu-ray subtitles, MPEG-4 lossless, and VP8. Version 1.1.1 specifically fixes a number of errors and crashes, along with assorted decoder/demuxer issues.

www.videolan.org/vlc/

Driver Bay

Razer Lycosa 3.00

For the Razer high-performance gaming keyboard, this driver update is for WinXP/Vista/7 (32-bit and 64-bit versions). The driver update supports in-game macro playback in games that otherwise are protected from out-of-game shortcuts, and it lets you assign macros to arrow keys.

www.razersupport.com

by Steve Smith

Broadband Benchmarking

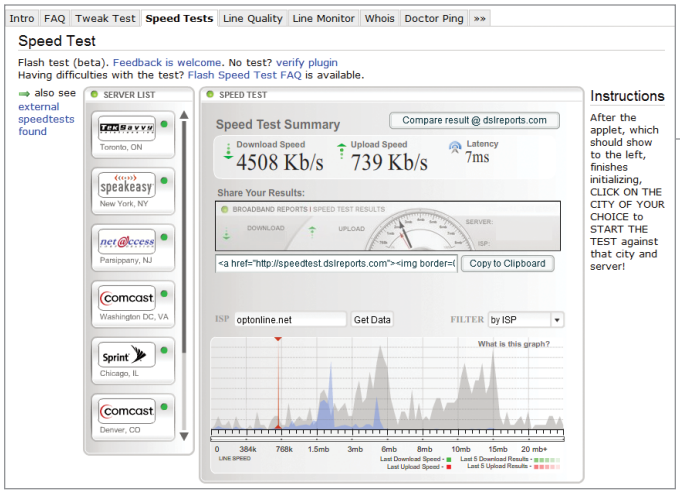
Tools To Measure Your Mbps

How fast is "fast"? That's the question many people ask themselves when they set up a broadband connection. If you're spending a pile of money every month on a high-speed hookup, you'll want to find out exactly how high that speed is. And the best way to find out isn't to take your provider's word for it; test it yourself.

A whole slew of Web sites and end-user utilities claim to test and report your bandwidth. We've taken a close look at them and rounded up the best and most useful of the bunch. Each of the sites and utilities tested had to satisfy at least three of the following criteria:

- Was it easy to run multiple tests (for example, at different times of day) and aggregate the results?
- Was it possible to test from multiple servers in different geographic locations?
- Was it easy to see the results at a glance?
- Was it possible to compare our results against others' (according to geographic area, ISP, etc.)?

At the end of our testing, we found one rather surprising discovery: The number of Web sites that met these criteria was far greater than the number of standalone desktop applications. To that end, you can start your online broadband time trials right now by simply opening a Web browser.



Broadband Tests And Tools
DSLReports
www.dslreports.com

DSLReports.com Broadband Tests And Tools

The broadband news-and-reviews site DSLReports.com sports both a friendly, tight-knit community of users and an impressive palette of tests. The site is one of the oldest of its kind and can trace its roots back to the birth of consumer broadband in the United States. DSLReports offers not only speed tests but also news, reviews, and comparisons of different ISPs.

The most basic and useful test DSLReports offers is the two-way Speed Test, which runs in Flash or Java. (The tests are also available in a couple of phone-friendly incarnations.) You pick a server that's as geographically close to you as possible, and Speed Test generates a graph of the results (download/upload speeds, latency). These results are plotted against an array of other results from the same ISP or can be cross-plotted against results from other ISPs or filtered by ZIP code as a way of seeing how speeds vary by geography.

Most of the tests are available to everyone, but some are restricted to members only (site registration is free) or require you to queue up for use. Among the other tests DSLReports.com offers is a packet-loss/line-quality test, although it requires that your IP address respond to a ping. This might require some configuration of your router or firewall, since either of these likely block ping by default. Less useful in my opinion are a couple of network-stack tweak tests (Doctor TCP and Tweak Test), if only because recent OSes have heavily self-tuning network subsystems.

One of the tools DSLReports offers, "Doctor Ping," can test your connection's latency against other ISPs. This isn't a site-based tool; it runs from the desktop and then posts the results remotely to the DSLReports' server. You also need a DSLReports account to see the results.

Another nice feature of DSLReports is the site itself. When you go to DSLReports' home page, it automatically detects your ISP and brings up the most popular threads posted on the message board devoted to that ISP.

Ookla Speedtest

A product of the network metrics company Ookla (www.ookla.com), the Flash-driven online version of Speedtest has some of the same features as DSLReports tests.

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Speedtest
Ookla
www.speedtest.net
●●●●

You won't find all of the community-centric features of DSLReports, as the site (www.speedtest.net) is mostly a free extension of Ookla's paid services—but the tests are well-designed and have a slick interface.

Speedtest.net sports basic speed and ping tests (the latter of which is hosted on sister site Pingtest.net), and Ookla.com's own site also has a stripped-down version of the more advanced Line Quality Test (www.ookla.com/demo-lq.php) that also includes the speed and ping tests. The latter takes longer to run than both of the former, so you can choose either a quick-and-dirty or a long-and-thorough checkup. The Line Quality Test checks for the presence of a firewall and can run on either port 5060 or port 8080, in the event one is blocked.

As with DSLReports' speed test, you start by choosing a server that's close to you. Speedtest.net has dozens of servers across both the continental United States and the rest of the world, so it's far easier to find one that's close by. The end results can be saved as an image or downloaded in a CSV table, so you can tabulate the results of multiple tests offline if you're inclined.

Pingtest.net works in much the same manner as Speedtest.net. You pick a site (typically one close to you) from a graphical map in Flash. The test measures packet loss, ping time, and jitter and then displays the results after a few moments. As with SpeedTest, you can leave feedback about your own ISP in the form of a star rating, and the average rating for your own ISP, based on other users' votes, is displayed automatically before you start the test.

Another sister site, Net Index (www.netindex.com), displays cumulative worldwide trends for upload/download speeds and line quality, based on the data submitted by Speedtest.net and Pingtest.net. If you're curious how your city or state stacks up against others, click around on the site. You may be surprised what countries and cities are at the top of the list.

Testmy.net

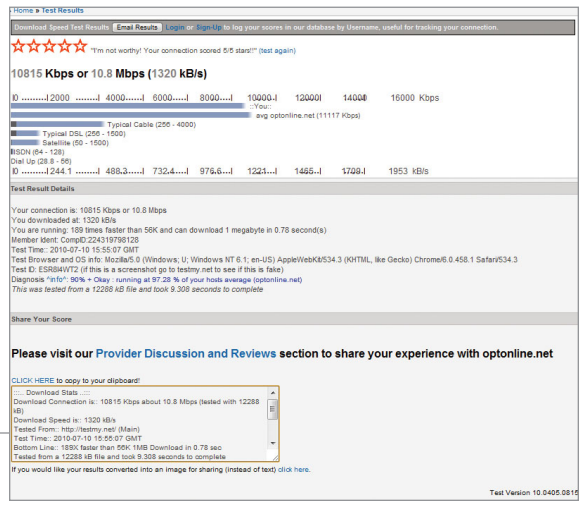
Another site organized around a thriving, tight-knit community of users, Testmy.net claims more accurate testing results than other sites due to its testing methodology. Even if that's a spurious assertion, I did like the way the tools were presented and managed, and I obtained useful results with them.

The tests are pretty basic. The site has upload and download tests, but no line quality or other auxiliary tests. When you run the tests, your browser automatically downloads several files of varying sizes as a way to gauge the speed of the line. The upload portion of the test doesn't provide you with the same degree of interactive feedback as the download test. Also, because the tests are run entirely in-browser, they seem to be limited by the browser's own design: Chrome 6 yielded an average of 526Kbps uploads, while Firefox 3.6.6 barely broke 80Kbps.

If you're looking for a quick test, you don't need to create an account on the site to access your statistics. When you run any of Testmy.net's tests, the site generates a unique machine ID for you, which you can then use to download all your test results. These stats expire after 60 days for non-members, though; members can keep stats for a year and get access to the site's forums.

Another feature I liked a great deal is the ability to automatically retest your connection at regular intervals, which is useful if you want to run speed tests in the background over a period of time and see how the connection varies. Note that in order to do this you need to leave a browser window open, because this feature works by periodically refreshing the window in question to rerun the test.

Testmy.net
●●●

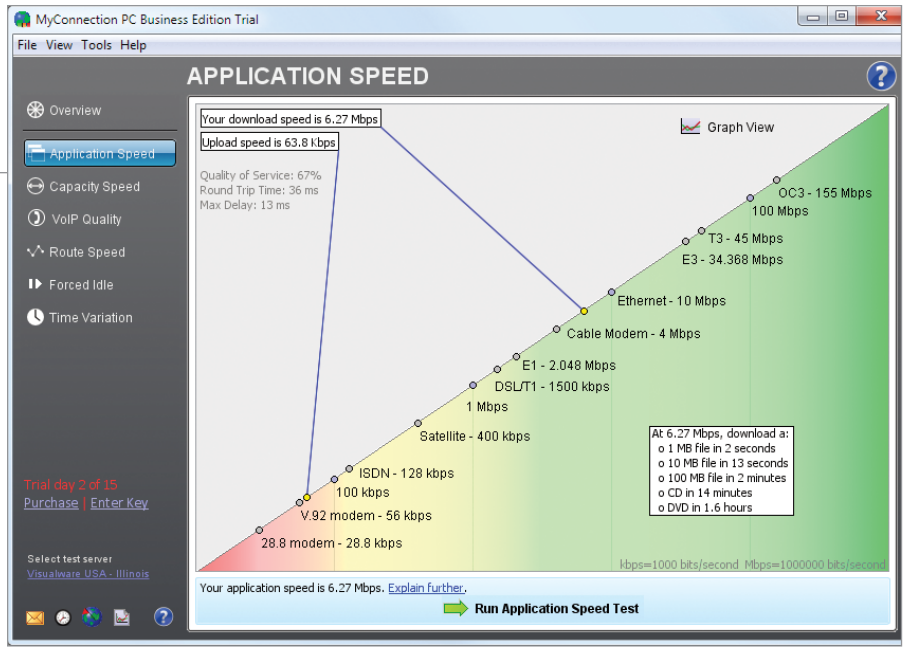


VisualWare MyConnection PC

There are scores of desktop applications that are little more than bandwidth usage gauges. The one desktop application that stands out from the bunch is VisualWare's MyConnection PC, which is an actual test suite on the order of the sites described here. VisualWare offers online versions of the same tests, as well

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●◐ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

MyConnection PC
Free
VisualWare
www.visualware.com



(at www.myconnectiontest.com), and a couple of other sites out there have reused the same connection test in its online incarnation. That said, the PC version is a little more polished.

MyConnection PC tests your connection against one of four servers—three in the continental United States and one in England. MyConnection PC is capable of reporting the results in up to six categories: application speed (the real download/upload speed available to programs), capacity speed (the sustained data rate for a connection), VoIP quality, routing speed, forced idle (a measurement of how many applications can efficiently use the connection at the same time), and time variation (whether your ISP moderates connection traffic over time). Categories vary depending on what version of the program you've purchased, but you can run all editions of the program as 15-day trials. MyConnection lets users repeat tests over time and aggregates the results into tables or graphs. It can also email you results.

The same company also makes VisualRoute 2010 (www.visualroute.com), a graphical traceroute program. Instead of testing your connection's bandwidth, it can help determine if the route to or from a particular Internet host is giving you trouble.

Better Broadband

There's no question the availability of broadband is on the rise. What's also on the rise is skepticism about how fast any given connection actually is, or how sustained the speed can be under real-world conditions. It's up to us to figure those things out for ourselves—and to keep a constant eye on them lest they change. Sites and apps like these are a good start, but we're looking forward to how they'll be revised to accurately test the multimegabit speeds that might become prevalent in the next decade. ▲

by Serdar Yegulalp

Guidelines For Testing

Testing your bandwidth seems like a snap if all that's involved is visiting a Web site and clicking a couple of links. The process is that simple in theory, but in practice it's all too easy to end up with speed readings that don't match up at all with reality. Here are a few best practices to keep in mind before running any tests.

Disconnect all other networked devices and close all applications that might be using the network. This way you won't have anything else confounding the test results, whether it's a chat client or a Netflix video stream. Likewise, if you're running a test from within a Web browser, close any tabs and/or browser windows that don't need to be open.

If your router also serves as a wireless access point, disable this function. It's best to do speed testing over a wired connection anyway. Turning off the wireless also reduces the number of variables that could complicate testing (for example, someone else unwittingly connects to the base station during the test).

If you have a router plugged into your cable modem, try directly connecting the cable modem to your PC's LAN port to see if that affects any speed test results. (Note that most cable modems will need to be reset or power-cycled if you change the device plugged directly into it.) If your router doubles as your cable modem, reset it using its reset switch. Unplugging it doesn't always ensure that certain settings are cleared.

If you must go through your router, disable any QoS functions your router may have. These can interfere with traffic and create anomalies in the measurements.

Run multiple tests. Tests run at daytime peak, off-peak, nighttime, and weekend hours may all yield different results depending on the total amount of traffic in your network neighborhood.

Use different browsers for browser-based tests that use the browser directly instead of running as a Flash plug-in. Chrome and Firefox, for example, can generate radically different results, most likely due to each browser's JavaScript engines. ▲

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Sony Vegas Movie Studio HD Platinum Production Suite

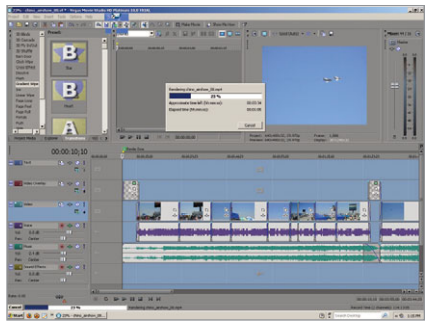
Although Adobe Premiere rules the roost of high-end video-editing software, the high end normally calls for professional-level experience and talent to use it effectively. Adobe's "prosumer"–level product is Premiere Elements, but anyone considering it would do well to check out Sony's (take a deep breath) Vegas Movie Studio HD Platinum Production Suite. Both ultimately do similar things, but Vegas' workflow is different and in some ways better, and the bundled programs that come with the suite are powerful tools you'll really want to use.

Vegas itself breaks your video project down with up to 10 tracks, up from the previous version's four, meaning you now have elbow room to lay down sufficient layers of video, audio, and effects to make a truly impressive video. Just drag and drop imported videos and audio files onto the tracks, lay them out and line them up, crop as necessary, and then drag one of hundreds of effects, transitions, or A/V filters. If you're unsure what to do, either view the included DVD tutorial (which is very good), or click the Show Me How toolbar button and watch Vegas itself prompt you to select this, click that, and choose the other option to get the desired effect.

Despite being only 32-bit, Vegas is remarkably speedy both in GUI responsiveness and rendering, the latter due in part to not reprocessing unnecessary bits, which Premiere Elements always seems to do. Vegas is also remarkably glitch-free, which can't always be said of its competition.

Vegas offers dozens of file-type/codec exporting options (including H.264-encoded MP4s), but DVD/Blu-ray authoring/burning duties are handled by DVD Architect Studio 5. The handoff is seamless, however, and although it's a new interface to learn, it is both simple yet option-packed. Also included is Sound Forge Audio Studio 10 (best described as a well-dressed cousin of Audacity), which includes a Vocal Eraser plug-in that can scrub, isolate, or pull out vocals from tracks.

Overall, Vegas is a well-rounded suite for advanced video-editing hobbyists or entry-level professional work. ▲



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by Warren Ernst

Immunet Protect Free 2.0.11.12

Zero-day threats are traditionally the most troublesome for antivirus products, since these threats are likely to infect your system before your antivirus product has had a chance to download its daily definition file update. Many security vendors are turning to "cloud-based" technologies to help stop zero-day outbreaks, on the theory that millions of computers looking closely at potential threats can spot them quicker than researchers working at an AV company.

To that end, Immunet Protect employs cloud-based technology to explicitly target zero-day malware, either working by itself or in conjunction with your existing security software. And while we're pretty sure "the cloud" is being used to distribute security information in this case, Immunet Protect does a poor job actually blocking zero-day malware in practice, making it hard to recommend, even as free software.

We admit there's potential here. Immunet offers free telephone tech support for this free product, which is basically unheard of these days. It starts up fast, consumes less than 30MB of RAM, and has a reasonably attractive and simple GUI. There's very little system slowdown when it's installed, and it doesn't interfere with Norton, McAfee, or about 30 other security tools. It performs scans relatively quickly, too. It also offers tools to make it easy to recommend it and provide download links to your online friends with just a few clicks.

Because Immunet's Web site promotes Immunet Protect as an extra layer of protection against online threats, yet also states it can work by itself, we dutifully installed it by itself and surfed to known infected Web sites, which then promptly installed polymorphic scamware to our test system with nary a complaint or hindrance from Immunet. Then more malware arrived. Repeated scans turned up nothing, even with the scamware generating numerous pop-up windows, which is embarrassing.

These threats are the kind of malware our top-rated security tools have been able to successfully block for more than a year, and we see no need to "augment" their abilities with Immunet Protect, regardless of its price or ease of use. ▲

Immunet Protect Free 2.0.11.12
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by Warren Ernst

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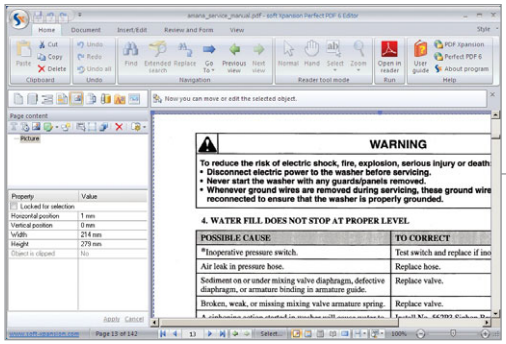

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PDF files are a double-edged sword. They're supposed to be uneditable documents, sort of like digital paper. This is great when you want a "permanent" online document that some yahoo isn't going to change on you. But on the other hand, it means when you spot an error in your own PDF files you can't "go in" and fix it without specialized and expensive software tools such as Adobe Acrobat 9 Professional ($449). One alternative is Perfect PDF 6 Editor, which runs about $35 (based on a late-July euro-to-dollar exchange rate) and begs the question: "Is Acrobat 9 Pro really 13 times better than Perfect PDF Editor?" If all you need is an occasional PDF editor that really works, then the answer is "No," but is that really all you need?

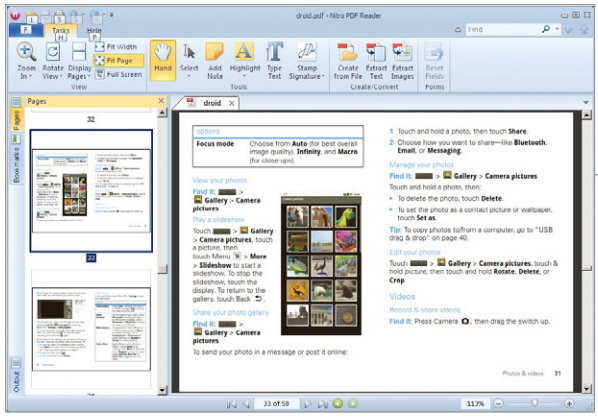
Sporting an Office 2007-esque Ribbon interface, Perfect PDF Editor looks slick. Common and uncommon commands are logically organized and look professional. Falling right to hand are the tools necessary to really edit text in a PDF file: add and remove words, sentences, or paragraphs as you see fit, though formatting basically remains as it is in the original PDF. Ditto for images. Don't count on any degree of text-reflowing or page-layout precision, but for making corrections, it works well. You can also change document attributes, such as paper size; add headers and footers; create bookmarks and hypertext links; or even embed multimedia files.

The biggest problem is speed. There just isn't any. Even scrolling though lengthy PDF documents causes pauses every few pages, and you can practically hear gears grinding when editing complex PDFs. There's a View File In Adobe Acrobat button in the Ribbon of Perfect PDF Editor, and we suspect you'll be using it a lot.

So for occasional minor changes to existing PDF files, PP6E is a worthwhile tool, but don't count on it replacing Acrobat for daily PDF reading. ▲

by Warren Ernst

Nitro PDF Reader 1 Beta



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●●●●

Although there are many PDF readers that don't bear an Adobe label, they still generally fall into two categories: free but light on features, or full-featured but not free. True, even the most expensive alternative PDF viewers are significantly cheaper than Adobe's Acrobat Professional, but sometimes it can be hard to justify spending anything on a product you'll really only use once sporadically at most. Nitro PDF Reader, on the other hand, combines a wide array of high-end features with a low price of nothing.

Nitro isn't simply a PDF reader. It can fill in forms, retain form data, and even "make" a form out of a scanned PDF that lacks traditional form fields. There's a full suite of commenting tools (sticky notes, text comments, and highlighting) and a signature tool for signing digital documents. Plus, Nitro can save PDFs with these additions.

Nitro uses two methods to create PDF files. The first is a fairly typical "PDF print driver." Select the Nitro PDF Creator printer in your program and print, and out comes a PDF. Alternatively, just drag a file on top of the Nitro Desktop shortcut, and it converts the file to PDF automatically.

Nitro has fully embraced the Office 2007-style ribbon interface. This interface doesn't always work for all programs, but it does work surprisingly well here, offering all the tools you need to work with PDF files without burying you under menus and buttons.

But as great as this seems, there's a catch: PDFs look terrible in Nitro. It occasionally displays text using unusual fonts, and its font-smoothing algorithm tends to make text appear muddy. Attempts at antialiasing lines make some look extra sharp and thin while others look fat and blurry. We hope this is a result of the beta status of the software and will be fixed soon. But for now it's a potential deal breaker, even when the deal is free. ▲

by Warren Ernst

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Open Sores

Linux Helps Level The Technological Playing Field For Developing Nations

So often, the tech world is overrun with sniping, fanboyism, malicious security threats, the rise and fall of tech empires, the skewering of famous CEOs, schadenfreude over failed products, Internet trolls, endless speculating on the Next Big Thing, spending unbelievable amounts of money on hot new products, labor issues in countries manufacturing our pricey gizmos, and on and on.

Even those of us who are enthusiastic about technology can get worn out by the constant din and all-too-frequent negativity. Every now and then, though, we're reminded why technology is important, why we care about it, and how it has the power to change things for the better.

The $35 Tablet

Recently, the Indian government's Ministry of Human Resource Development announced that it will be selling tablets to students at the triple-take-worthy cost of $35. If that weren't inexpensive enough, the Union Minister of HRD, Kapil Sibal, announced in an official government press release that eventually, the Ministry planned to get the cost down to $20, then $10 per computer. The ambitious project is designed to get technology into the hands of more people in rural India.

The Indian government is working with R&D teams from Indian technical institutions of higher learning to develop technology to achieve those low costs and address any other issues that arise with the computers.

There is little information presently available regarding exact specs. According to an Indian TV newscast, the tablet features a touchscreen, 2GB of RAM, Wi-Fi capabilities, and USB ports. The motherboard was homegrown by university students (overseen by professors). There is no word yet concerning an operating system or software, but it's a good bet that one of the many lightweight Linux OSes currently in development could deliver.

Kapil Sibal of India's Ministry of Human Resource Development shows off the prototype of a $35 tablet computer being developed for Indian students.

The OLPC Project

Imagine a $10 tablet that could connect to the Internet and run a few decent applications . . . it's kind of unbelievable, especially considering another desirable, low-cost computing option for the developing world is the $199 XO laptop from the One Laptop Per Child project.

The brainchild and enduring passion of Nicholas Negroponte and a gang from MIT's Media Lab, the OLPC Project has been around for a few years, offering the relatively low-cost, durable XO laptop to children in developing nations and other areas where kids want for access to computers because of the expense.

The issues the group faced in terms of design are both fascinating and seemingly insurmountable; many of the target children worldwide live in grass huts or equivalent domiciles. Many go to school outdoors. Many have no electricity anywhere nearby. And, of course, they're all children, and one thing all kids have in common no matter which continent they live on is that they tend to be rather destructive.

Thus, this little laptop had to be virtually indestructible, resistant to drops as well as impermeable to dirt and water. It needed to draw very little power, and it somehow needed to be able to connect to the 'Net. The display needed to be visible in direct sunlight. Oh, and its components needed to be incredibly inexpensive; Negroponte's original target price was $100.

In the end, although the XO ended up costing nearly twice that much, the team

Imagine a $10 tablet that could connect to the Internet and run a few decent applications . . . it's kind of unbelievable.

managed to produce a laptop that met the other criteria.

The current XO has a high-resolution (1200 × 900, 200dpi) monochrome display that rotates for different usage scenarios and is indeed readable in sunlight. Under the hood, the XO is powered by AMD's Geode LX-700 (I had to Google it, too) clocked at 433MHz with embedded graphics. Instead of a hard drive, the XO is equipped with 1GB of flash storage and sports DDR333 (166 MHz) RAM.

Additional features include built-in speakers and microphone, microphone and headphone jacks, a video camera (640 × 480 resolution at 30fps), three USB ports, an MMC/SD card slot, and a dual capacitance/resistive touchpad. For connectivity, the XO has 802.11b/g, as well as 802.11s for mesh networking. On top of all that, the bright white and green case is kind of cute.

The hardware is cleverly designed, but the OS and software is where open source steps in to help deliver low cost with sufficient features. The OS and software are the Sugar Learning Platform and the GNOME Desktop, and the tools therein are rather impressive.

Sugar offers a way to connect with other users via a mesh network, browse the Web, draw and paint, work math problems, learn basic programming skills, play games, read e-books, create and edit video, create music and software instruments, and more.

The OLPC folks continue to press on and innovate. The group's next computer, the XO 1.75, is slated to appear in 2011 and will purportedly have some performance enhancements over the original XO yet will cost closer to $150. A $75 super-thin tablet called the XO 3.0 is also in the works.

Reality Bytes

Granted, there have been announcements in the past about fantastically inexpensive computers for developing nations and poor kids that turned into little more than vaporware. This exciting announcement from India may turn into the same. Even the OLPC project has had its share of critics and failures along the way. (A $199 laptop may have seemed unbelievable a few years ago, for example, but now cheapie laptops are everywhere.)

The XO laptop is the flagship product of the One Laptop Per Child project.

Maybe these products are pipe dreams and changing the world through inexpensive computers is overly optimistic. As some critics have pointed out, who cares if you can create a software synthesizer on your cool tablet if your belly is empty and your throat is dry? On the other hand, maybe inexpensive computers really can help change things for the better; the answer to this question is far from certain.

What is certain, however, is that increasingly, open-source operating systems and software are delivering excellent features while requiring fewer and fewer hardware resources. If there's a bottleneck, it's elsewhere, both in terms of cost and functionality. After all, a $100, $75, $35, or $10 computer would be quite impossible if the OS cost $80.

On Hardware

It's impossible to think about India's proposed $35 tablets and not compare them to their exponentially more expensive lookalike, the iPad, produced by one of the growing behemoths of the computing industry that is essentially the antithesis of open-source anything.

Although the iPad is on a different plane in terms of capabilities than these inexpensive machines, they're all essentially the same basic device.

Is the iPad really so many times better than the OLPC or this promised $35 tablet? Probably not, and that highlights the disparity between the for-profit world and the non-profit one.

However, although it would be easy to snarl and wag a finger at Steve Jobs and his expensive toys that only the richest people in the world can afford, I think it would be a mistake. So what if Apple rakes in money hand over fist on its products? It's allowed to; that's how capitalism goes.

Further, how much of the technology developed by companies trying to get rich eventually becomes inexpensive yet effective for projects like the ones above? Would the cost of those components plummet so low if those companies didn't develop better and faster components to replace them and keep pace in the competitive market? One man's trash, you know . . . .

To be clear: No one is saying that you should pat yourself on the back for subsidizing a computing revolution for the developing world by buying a new (insert expensive device) to replace your (insert one-year-old expensive device). But it's important to remember that this year's cutting edge is next year's quaintly nostalgic technology, and in that sweet spot where the technology is still relevant but costs next to nothing, it can change the world when the right people get involved. Especially when the OS and software cost nothing to begin with. ▲

by Seth Colaner

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Black Series

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Hulu Plus

Can Hulu Beat Itself At Its Own Game?

After months of rumor and speculation about a coming subscription model, the wildly popular TV site Hulu launched its premium subscription service early this summer on an invitation-only basis. But will people pay for this brand of TV?

Following almost two years of building its audience through free, ad-supported access to recent and older full episodes of prime time broadcast shows, this joint venture of NBC Universal, News Corp., and The Walt Disney Company appeared to be following a trend among media companies of making users pay directly for certain content.

Fee Joins Free

Hulu quickly became one of the most popular online video destinations by giving users free access to recently aired episodes of programs such as "Family Guy," "Lost," and select episodes from TV history. The model worked. In May 2010, Hulu served over 1 billion video streams, second only to Google properties, mainly YouTube, and was attracting 43 million unique users.

Dubbed "Hulu Plus," the new project is a $9.99 per month service that distinguishes itself from the continuing free Hulu site with added content, video quality, and accessibility. Hulu Plus offers a deeper trove of content, including the full run of current season programming for top shows such as "House" and "Friday Night Lights." Many of these shows can be streamed at 720p HD quality. Even more impressive, the premium service has complete back catalogs of several legendary series, including "The X-Files" and "Law and Order: SVU." There are 10 years of full "Saturday Night Live" episodes, plus piles of individual clips of the variety show. In total, there are over 2,000 episodes in the Plus library, and Hulu is regularly adding new material.

But in addition to pouring on the content, Hulu Plus is trying to define "premium" value as ubiquitous access to content. Unlike the core Hulu product, which is available only on PCs in a browser or the Media Center, Hulu Plus is also accessible via discrete apps on the iPhone, iPod touch, and iPad and on a TV screen via the Sony PS3 as well as select Internet-enabled TVs and BD players. Each of these interfaces is slightly different, but they access similar content and maintain a user's viewing history and Queue of content across the platforms. The clean and simple Hulu interface is apparent throughout. A catalog of TV episodes and a narrower collection of older and obscure films is available for streaming. The PC interface lets you subscribe to shows so that new episodes show up in your Queue. Hulu Plus also tracks across the platforms what you have watched most recently. When we started watching a show on our iPhone, stopped in the middle, and loaded Hulu Plus on our iPad, the program asked us if we wanted to continue what we had paused on the other platform.

For critics and analysts who have been urging the major broadcasters to extract more value from their online properties, the arrival of Hulu Plus is a sure sign that major media are working to go beyond free-only models online. "I think it is a great idea," says Laura Martin, managing director and senior analyst of Entertainment, Cable & Media at investment bank Needham & Co. Even with ads wrapped around their TV content, the broadcasters are realizing a fraction of the revenue from the Web that they draw from on-air viewings, and this model cannot survive, she argues.

"Television programmers should protect the value of their entire distribution ecosystem. Therefore, no one platform and no one delivery mechanism should be vastly cheaper than everything else. Putting your long-form content on the Internet for free destroys the value."

Other media providers such as Pandora and eMusic generally succeed in converting up to 10% of their base of free users into premium customers, according to Martin's research. Although live TV episodes are still free on network TV, back catalogs and easy access to TV libraries are

extras that usually come at a cost, through pay-per-view or DVDs. When putting these wares online, Martin contends, media companies have to assign some value to them.

"You shouldn't be retraining the consumer that he can get a price discount [online]."

And Now, More Words From Our Sponsors

But is Hulu Plus, a big, always-on vault of prime time's past and present, something we all want to pay for? "I think it is an open question whether consumers will pay $10 a month for a subscription service that is primarily about broadcast TV programs," says Will Richmond, president of Broadband Directions. Although Richmond praises Hulu Plus' presentation, usability, and video quality, he says the overall focus on TV is limited.

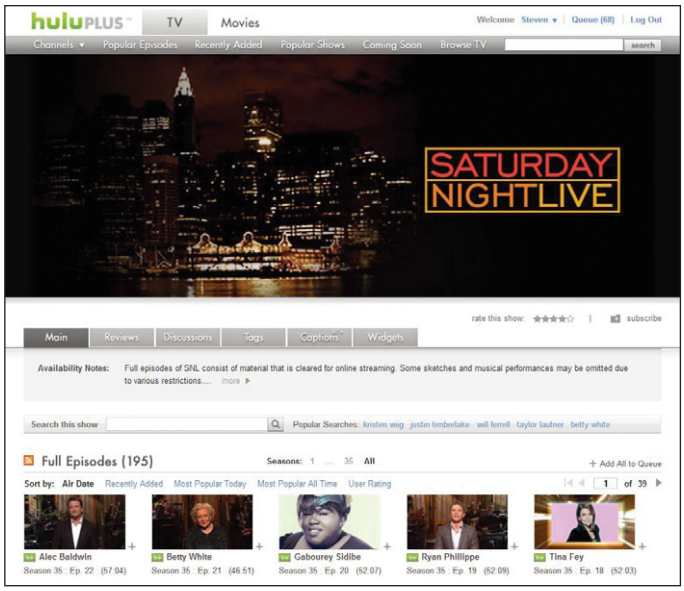
"It is a new concept for consumers to pay for broadcast TV," Richmond says, adding, "the content offering is relatively narrow when you compare Hulu Plus to what is available on Netflix or cable TV subscriptions."

But the most surprising aspect of the Hulu Plus model may be the presence of advertising. Hulu Free has been famously effective in bringing major brand advertisers into online video. Even competitors, such as Erick Hachenberg, CEO of short-form video hub Metacafe, credit Hulu with invigorating the entire market.

"Hulu has been very positive for the industry. It brings credibility to advertisers about where the industry is going. It shows them that this is the future."

Despite the addition of premium content, Hulu Plus will have just as much advertising as the free service. In fact, the company defines Hulu Plus as a "new, revolutionary ad-supported subscription product." Richmond argues that this hybrid model is a mistake, even though cable TV is both ad-supported and subscription-based.

"I think [a hybrid model] is more troubling with Hulu. You can't skip the ads. Most people will say Hulu is a free Web site where you have ads, but wait a second—now they are charging $10 a month and they still want to send me the ads? Most people would feel that's not appropriate."



Hulu Plus piles on the value, including full runs of series such as Saturday Night Live, going back to the first episodes in the mid-1970s.

In Search Of New TV

While the major networks, Hulu, and some cable companies are moving toward a model of putting "TV everywhere," the majority of online video involves shorter clips from a variety of sources. Metacafe's Hachenberg applauds Hulu's success in raising the profile and legitimacy of online video but questions whether porting old media onto a new platform really is what consumers want most.

"From a consumer perspective, it's the same show, the same advertisers, the same business model, the same experience. There's not a lot of innovation there."

Short-form video hubs like Metacafe were born on the Internet and are creating new models for consuming video. Unlike the classic "lean-back" method of media consumption that TV invented, the short-form video phenomenon is a new and highly interactive activity, whereby users assemble their own video experiences through search and discovery.

"On the Internet, you define your pathway every two to three minutes," Hachenberg says. The coming of Hulu and the other networks to the Web has raised the expectations for video quality and moved companies like Metacafe toward new models that involve more professional content. For example, Metacafe now focuses on channels of content related to TV, movies, and gaming that give the visitor quick updates, trailers, and news on what is going on in each sector. The Web allows publishers to specialize and focus on niches in ways the big TV networks can't.

"Nobody controls it," he says. "In the end, Hulu is owned and controlled by the TV networks. It's the same business."

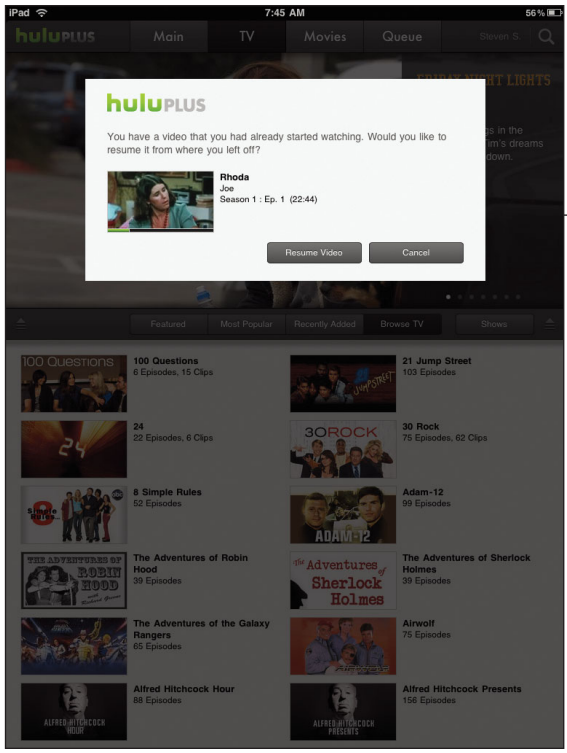
TV 2.0

But if the TV networks themselves have their way, both the Web and other technical innovations will help remake that old lean-back medium into a different sort of business that is more interactive. "Mobile and the iPad are game changers," says Martin. "Presence," or the ability for content to follow you across devices and places, is a very powerful draw, she says. TV will be on demand everywhere and in a seamless way that lets users pause, switch devices, and pick up where they left off.

> "Hulu has been very positive for the industry. It brings credibility to advertisers about where the industry is going. It shows them that this is the future."
>
> *Erick Hachenberg, CEO of Metacafe*

For the networks, however, mobile devices are not only opportunities for more broadcasting but also for audience interactivity and sharing. Nick Johnson, NBC Universal's VP of Digital Media Sales, says that TV viewing working in tandem with the Web or mobile devices takes television viewing into a new communal level.

As TV moves to the Web, the viral multiplier effect kicks in. "Not only are [audiences] talking to other participants, but everyone in their social graph is seeing the conversation happen through Twitter or Facebook." NBC's Oxygen and Bravo cable networks have been running Web-based real-time chats during the live broadcasts to generate more interest in shows. "We're literally seeing that a show is able to leverage the dialogue online to drive incremental ratings points on air."



Available on the PC, PS3, iPhone, and iPad, Hulu Plus tracks where your viewing of a show left off on one platform and invites you to resume when you log in to your account on one of its other platforms.

Despite this, one of the lessons of the Web economy is that success is fleeting. AOL and MySpace seemed indomitable in their time. Martin warns that the days of mega-corporations like TV networks and their 50-year reign may be over.

"The concept of a clear winner in the Internet isn't so clear. When you win online, it may only be for 10 years." ▲

by Steve Smith

The Peacock, Digitized

One of the primary partners in the Hulu joint venture, NBC Universal, has its own popular suite of sites where tens of millions of visitors come for full episodes of recently aired shows. We asked Nick Johnson, NBC Universal VP of Digital Media Sales, how people are using the Web as a DVR, and how the TV business is using the Web to keep in closer touch with viewers' tastes. NBC Universal runs recently aired shows from NBC, Bravo, Syfy, Oxygen, and USA on Hulu, of which it is part owner.

CPU: How has TV viewing on the Web grown for NBC, and how does it affect TV viewing?
Johnson: The growth has been very, very strong online over the last three or four years. And what we found as this growth is happening is that it is very much complementary to our on-air viewing. A lot of the behavior about online [viewing] is about people that are discovering new shows they haven't watched on-air or haven't thought to DVR. "The Office" is a show that people will come and watch multiple times even though they watched it on-air. But we find most people are either coming to NBC.com to watch shows a second time or catch up on episodes they missed.

CPU: How long are people staying? Are they really watching full episodes?
Johnson: The thing that we love about our full episodes in digital is that we really do have a very engaged consumer. They are in lean-forward mode. They have a computer in front of them and when they seek out and find content they are passionate about, they will sit through a full episode. In fact, they will sit through multiple episodes. The conclusion rates on our streams are very, very high, and we love that.

CPU: Where and when are people tuning in?
Johnson: At work is big. Lunch tends to be big. And then there is a good correlation rolling out after prime time where people are catching up on shows as they conclude on-air.

CPU: Are there instances where online loyalty to a program is keeping a program on air even though it might have been canceled otherwise?
Johnson: In the last couple of years, there have been strong movements for shows like "Chuck" and "Friday Night Lights," where I think our audience has been able to leverage the Internet to help amplify their voice. I think that certainly is true in the case of "Chuck," which is pretty well documented. The fan base was pretty important in at least making sure that NBC heard that there were a lot of people that cared about the show and characters.

CPU: Would you ever have a paid model at NBC.com?
Johnson: TV online is ad-supported. I am certain that people are always trying to think about how to make the experience better and to make sure that ultimately they are contemplating many models. But the past for us has been ad-supported full episodes online. ▲

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CPU Game Of The Month

Yeah, we know you have blogs to post, video to encode, reports to write, and code to compile. We do, too, but you have to take a break once in a while (and maybe blow some stuff up). That's why each month we give you the lowdown on what to expect from the latest interesting PC and console games.

$59.99 (PC, Mac) • ESRB: (T)een
Blizzard Entertainment
starcraft2.com

StarCraft II: Wings of Liberty™

Twelve Years In The Making—*by Dr. Malaprop*

There's little in the way of explanation needed for a game like StarCraft II, called Wings Of Liberty in its first iteration. Revolving around a very human storyline, there are two main components in StarCraft II: the epic campaign and the deep multiplayer game. The nonlinear campaign brings 29 missions interspersed with top-notch and fully acted CGI scenes to tell the story. Furthermore, there are branching research trees where you have to choose one technology path while forgoing another. Between missions, you return to a central base, meet different characters, and generally get a little break between the intense missions.

As Jim Raynor, you're a rebel fighting the Dominion, regretting the death of Kerrigan, and then all hell breaks loose. The Wings Of Liberty's narrative drops off more abruptly than we'd like at the end game—even with the expectation that the storyline is going to be doled out in two additional games focusing on the other two races. Not having other races to play in the campaign is a minor complaint because the game mixes up the mission styles and objectives *constantly* to keep gameplay fresh. The varied mission design keeps you interested from start to finish. However, you do get a very brief opportunity to play as another race, which whet our appetite for the next two games in the StarCraft II trilogy.

Fortunately, multiplayer matchups let you play as Terran, Zerg, or Protoss. Much has been made of the original StarCraft's multiplayer mode. Jumping into multiplayer matches is rewarding, but it can be intimidating for the casual player. That's why we enjoyed Blizzard's matchmaking via the mandatory Battle.net system, where you are matched to similarly skilled players.

The game features 50 unranked matches, where you can play risk-free as you find your multiplayer legs. Additionally, you can play co-op with a friend against the AI and Challenges that will help you hone skills. These become necessary to enter more competitive multiplayer levels. Anyone that has experience with the original's multiplayer modes will recall being able to spawn the multiplayer game from a single purchased copy onto several PCs. Unfortunately, StarCraft II eschews spawning and requires a copy of the game for each player. Adding insult to injury is the lack of a LAN multiplayer mode. Those of us who enjoyed two-player vs. games with a single copy of StarCraft are going to be forced to purchase two copies of the game and play through Battle.net even if we're in the same house.

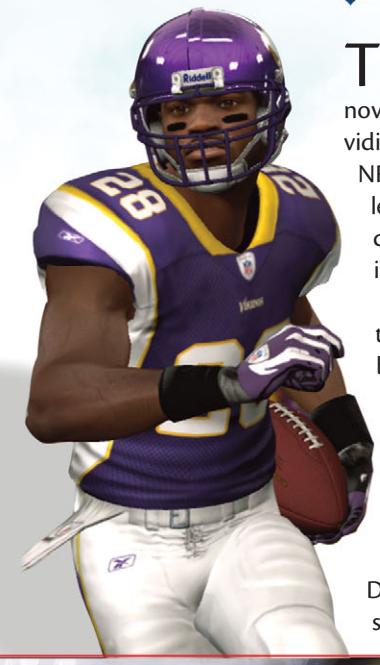
We've nitpicked on a few issues, but if you like RTS games, StarCraft II is a no-brainer purchase. The title's ambitious character and polished gameplay experience provides much bang for the buck even if you don't delve into the multiplayer component. Those on the fence about RTSes should also give the game a chance. Remember, StarCraft II is going to be remembered as one of the best in the genre. ▲

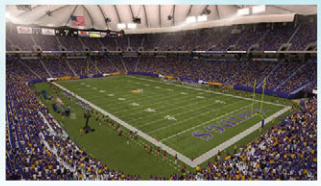
SAMWISE 2005

MADDEN NFL 11

$59.99 (X360, PS3); $49.99 (Wii); $39.99 (PS2, PSP)
ESRB: (E)veryone • EA Sports • www.maddennfl.easports.com

The Only Game In Town—*by Josh Compton*





The Madden franchise has been around for 20 years and has seen varying degrees of innovation between titles with some years providing more changes than others. In Madden NFL 11, EA Sports attempts to shorten game length while improving presentation, play calling, and gameplay; and for the most part, it succeeds.

The Franchise and Superstar modes are relatively untouched, though. There are still exhibition games and Madden Moments, but EA also added the option of playing Super Bowl XLIV with unique presentation elements that make it a cool experience. The best game mode addition is 3-on-3 online multiplayer. In this mode, you can control the QB, RBs, or WRs/TEs on offense and the LBs, D-Line, or DBs on defense, which allows for instant accountability.

The controls have changed so that while running, you only need to use the two sticks to move the ball forward and execute jukes and spins. The computer handles any sprint moves. A new mechanic called GameFlow lets you choose to have the coach call the plays for you while giving you insight over the headset. You can turn off or ignore these features using the customizable settings. Game designers moved hot routes to the D-pad, which is jarring at first but only takes a game or two to get used to. Player models, stadiums, and animations continue to get better. The addition of Gus Johnson brings new energy, but the commentary is still lacking. The new additions and lack of significant flaws makes Madden NFL 11 one of the best iterations in the series. ▲

MAFIA II

$49.99 (PC); $59.99 (X360, PS3) • ESRB: (M)ature
2K Games • www.mafia2game.com

Beauty & The Beasts—*by Chris Trumble*

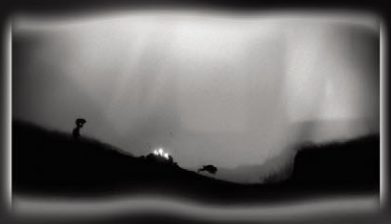
Americans have had a strange fascination with criminals in general and old-school mafiosos in particular for a long, long time. One need look no further than the popularity of such films as "The Godfather," "Goodfellas," "Casino," and others to see that despite the abhorrent nature of organized crime's methods, we can't help admiring the way mobsters make their own rules and lead lives of excitement and privilege—real or imagined.

2K Games has done an incredible job of bringing that excitement to the sequel of Gathering's 2002 hit, Mafia; the game is violent but drips with nostalgia and, dare we say it, romance. In the game, you play the role of Vito Scaletta, whose family leaves Sicily for the United States when he is a boy. Vito grows up in poverty, and he and his friend Joe turn to robbery as a way to make ends meet. After getting caught robbing a store, Vito is given a choice: He can either go to prison for a long time or he can serve his country in Europe, where World War II is raging. Vito chooses the army, gets wounded in action, and is soon home, where his friend Joe introduces him to organized crime.

The simple act of walking down a back street in Empire Bay as Vito returns home is a surprisingly rich experience. Snow is falling gently, passersby are chatting, and you can hear Sinatra playing nearby. The game isn't always this peaceful and picturesque, to be sure, but it is always this compelling and constantly draws you into Vito's story.

The action is fast and fun, the graphics and sound are exemplary, and the story is a richly told tale of one man's rise to wealth and power through his intellect, his will, and his skill with a gun. Mafia II will undoubtedly go down as one of the best games of 2010. ▲

LIMBO



Neither Here Nor There—*by Josh Compton*

Immediately after beginning our first playthrough, we knew we were about to experience something special. Limbo, a trial and error, puzzle/platforming game from Playdead, has only a semblance of a story that comes from the game's description: "Uncertain of his sister's fate, a boy enters Limbo." With that, you are dropped into a black and white world filled with light, shadows, and a menagerie of creatures and contraptions out to prevent you from reaching the end (and whatever may wait for you there).

The setting is beautifully crafted as a forest filled with bear traps gives way to an industrialized site made up of metal and machines. The controls are simple and responsive with buttons for movement, jumping, and actions (activating a switch, pulling a crate), but it takes great timing and quite a bit of thought to make it through the puzzles that become progressively harder as you move forward. The sound design is fantastic with musical cues and sound effects used sparingly to create an atmosphere of curiosity but also dread.

The sheer imagination and creativity on display in Limbo, coupled with the sense of accomplishment after completing the more difficult puzzles, is more than enough to warrant a purchase. Limbo is an experience you can't miss and one of the few truly original offerings available in the Xbox Live Arcade. ▲

1,200 MSP ($15) (Xbox Live Arcade)
ESRB: (T)een • Playdead • www.limbogame.org

DeathSpank

Humorist Twist On Diablo
—*by Dr. Malaprop*

$15 (X360, PS3) • ESRB: (T)een
Hothead Games • deathspank.com

What name could possibly be better for a true hero than DeathSpank? Indeed, as DeathSpank, you will be called upon to seek out a powerful ancient artifact known as, um, "The Artifact." You'll quickly notice DeathSpank is a self-aware game and provides ample optional dialogue that should keep you smiling as you play. The game's sense of PG-13 humor comes courtesy of Ron Gilbert, the writer from classic LucasArts adventure games, including the first two Monkey Islands.

Anyone that's played Diablo or Torchlight will recognize the third-person, isometric, Diablo-style view with quest-based RPG gameplay. Visuals benefit greatly from the quirky and cartoony art. We also felt that the audio, especially DeathSpank's voice, fit well into the game's tone.

As a game that's exclusively available via the Xbox Live Marketplace and PlayStation Network, you'd be forgiven for thinking that $15 buys you a less robust game. This time, you'd be wrong. The budget price will give novice and advanced players plenty to do for about 10 hours. DeathSpank features adventure game-style puzzles but mostly focuses on hack and slash gameplay. You can also have a friend play along in a limited co-op mode. ▲

DarkStar One
Broken Alliance

Elite Space Combat Experience
—*by Dr. Malaprop*

First-person space combat games are quite rare on consoles. DarkStar One follows in the flight path of Elite (an early favorite of ours from 1984), Privateer, and Freelancer. As Kayron Jarvis, you start as a novice pilot with a uniquely upgradable ship called DarkStar One. While the game progresses, you learn that your father died under mysterious circumstances when you were a child, and naturally you must investigate. Along the way you'll spend your time smuggling cargo, trading commodities, escorting ships, collecting bounties, and liberating planets. The missions earn funds and uncover artifacts you can use to upgrade your ship. The dozens of star systems provide many hours of open-ended play.

Outdated cutscene visuals coupled with poor voice acting don't enhance the storyline. However, the lack of polish doesn't affect how well the space combat gameplay holds up. When starting out, keep the manual handy until you're acclimated to the controls. DarkStar was released for the PC in 2006 and upgraded for 1080p with improved console control. It played better on the PC, but the developer did a good job with this recent console port. ▲

$49.99 (X360) • ESRB: (T)een
Kalypso Media • darkstar-one.com

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by Barry Brenesal

When Bigger Was Better

It is axiomatic that no generation recognizes the benefits it's reaped from recent innovations that have become the norm. This amazed me once again when my wife and I gathered a bunch of CDs we own last week and transferred them to an MP3 player for a long vacation in Hungary. It's a Lilliputian medium we take for granted today, but consider: Back in the 1930s, if there had been a complete recording of, say, Wagner's four-opera, 15-hour-long work, Der Ring des Nibelungen, it would have required roughly 120 78rpm shellac records, weighing approximately 60 pounds in all. After the industry made the jump to 33 1/3rpm vinyl records in the 1950s, the whole thing could have been encompassed in a box of less than 20 pounds—and was, when the first Ring Cycle (as it's often called) was commercially released in the mid-60s. A much smaller box is needed to hold the operas on 12 to 15 CDs, and a single, feather-light MP3 chip can easily manage multiple versions of the entire thing, depending upon storage capacity.

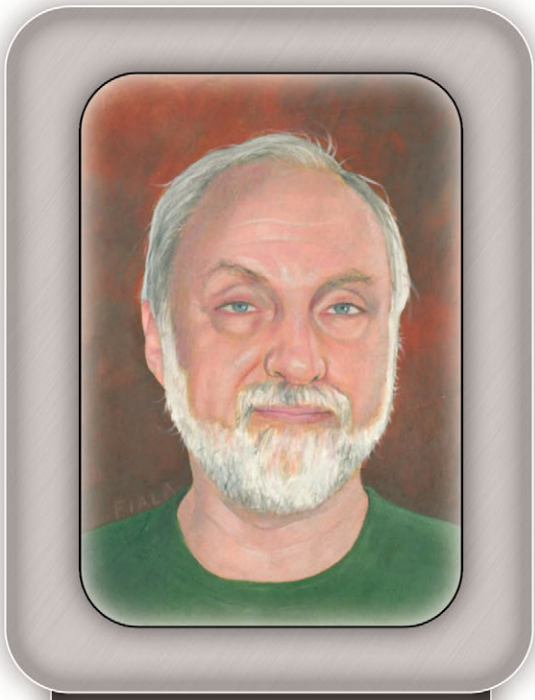
Miniaturization is amazing. Still, the illustration I've provided doesn't impress teens that have only seen a phonograph if their parents keep one in the attic, and usually refer to it as "a museum piece." Speaking as a museum piece myself, I find that the best way to impress the youth of today is with a two-by-four. I mean that figuratively rather than literally (in case you were wondering), through examples a lot less subtle than those involving records and hence easier to imagine.

In other words, computers. Consider your laptop, or better still, your smartphone if you have one. Now, envision another computer with less than 1/100,000th of its power, weighing 30 tons and consisting of 30 separated 8-foot-high dorm locker-like units plus a power supply, all dumped in a 20- x 40-foot room—one cooled with its own industrial-strength air-conditioning unit, since this monster produces 174kw of waste heat. That was ENIAC, the Electronic Numerical Integrator and Calculator. It was developed by a team at the University of Pennsylvania between 1943 and 1945, then unveiled in 1946. It had no chips, but employed a mix of almost 18,000 vacuum tubes, 70,000 resistors, 10,000 capacitors, 7,200 crystal diodes, and 1,500 relays, all connected via roughly 5 million hand-soldered joints.

ENIAC was the U.S. Army's baby. By comparison, the U.S. Navy financed its own computer, Mark I, built by IBM and operated at Harvard starting in 1944. It was a lightweight compared to ENIAC, just 5 tons, but required a 50-foot shaft driven by a 4kw electric motor to synchronize the machine's calculating units. Where ENIAC was programmed and controlled by an unwieldy combination of punch cards, patch cords, and 3,000 switches, Mark I used 24 input channels for paper tape—and because its logic didn't employ conditional branching, those tapes tended to get very long. At the time, both computers were heralded for their ability to crunch numbers far faster than humans. As is often the case when enthusiasm, the military, and government meet, there were many successors.

EDVAC, the Electronic Discrete Variable Automatic Computer, was able to store programs, unlike its predecessors. It was delivered to the Ballistics Research Laboratory at the Aberdeen Proving Ground in Maryland in 1949. ORDVAC was yet another computer built for the BRL, this time at the University of Illinois, and followed by a series titled ILLIAC. Then there was the RAND Corporation's JOHNNIAC, or John v. Neumann Numerical Integrator and Automatic Computer, which ran from 1953 to 1966 with over 50,000 operational hours, or slightly more than the average undergrad spends in total on an MMO game. Nor must we forget MANIAC, the Mathematical Analyzer, Numerical Integrator, and Computer, designed by Nicholas Metropolis and built at Los Alamos. Metropolis, whose own name sounds as though it came from a Barbarella comic book, acknowledged the name was chosen in hopes of stopping all the silly –IAC names of the big mainframes.

There pastured the behemoths, now extinct. They were the pioneering computers, and the most potent comparative examples I can think of to show the hidden force of miniaturization acting upon our modern lives. ▲



Barry Brenesal has written more than 1,000 published articles and reviews on electronic technology since 1987. His first personal computer was a Radio Shack TRS-80 model 100. It was last seen functioning as a boat anchor.

Wax nostalgic with Barry at barry@cpumag.com

Software Tips & Projects

Expand Your Windows 7 Bag Of Tricks

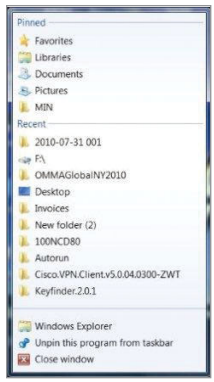
After a couple of months drilling into the workings of Windows 7's WinXP Mode, let's look at more straightforward, general tips for tweaking Win7 to our personal computing habits. We are coming up on the first anniversary of the new operating system's release, and many of us have settled into the OS's many foibles. This month, we take control.

Taskbar Tools

We're all still getting used to the new functionality and quirks of the Win7 Taskbar. There's so much going on in the Taskbar now that we found having a few shortcuts and tweaks may make life easier. First off, keyboard devotees can minimize their mouse use by using the Win-T combo to navigate the Taskbar icon with the arrow keys. Highlighting each icon will bring up the thumbnail(s) of open windows. Simply press the Up arrow to highlight the thumbnails and press ENTER to switch to that window.

Another great Taskbar shortcut will instead cycle through the open iterations of a given program. By pressing CTRL and clicking on the Taskbar icon of a program, you will bring the open windows of that program to the foreground in succession.

In addition to simply being handy, Jump Lists, a feature built into the Taskbar, are also customizable. To do this, open Windows Explorer, right-click its Taskbar icon, and click Pin This Program To The Taskbar. Now you have a permanent Explorer icon, and this can turn this into a mass of shortcuts. With Explorer open, you can drag any of the navigation shortcuts (Favorites, Documents, Videos, etc.) onto the Windows Explorer Taskbar icon, and it will be pinned to the icon's Jump List. In fact, you can drag and drop any folder from the Desktop onto this Explorer icon to pin it into the Jump List.



A Windows Explorer folder pinned to your Taskbar can itself become a repository of additional shortcuts you can add to its Jump List.

Time After Time After Time

For those of you who work with remote offices around the world, Win7 gives you the ability to display the current time in two additional time zones. If you are working with a European or Asian partner, this is much easier than doing the math in your head every time you want to make a call. Click the date/time in the notification area of the Taskbar and then click Change Date And Time Settings. In the open dialog box, click the Additional Clocks tab and designate the time zones for your second and third clocks. (You can also give them custom names.) Mousing over date/time the icon will pop up all three times.

Disable Mobility Center

If the Mobility Center tool is just another annoyance that accidentally pops up when you press Win-X (often instead of CTRL-X to cut something to the Clipboard), then here is a quick Registry hack that disables the tool altogether. In Registry Editor, navigate to the HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies key. Add a new key named "MobilityCenter." Highlight the new Key and add a new DWORD (32-bit) named "NoMobilityCenter." Give this entry a value of 1 and say goodbye to Mobility Center inadvertently opening.

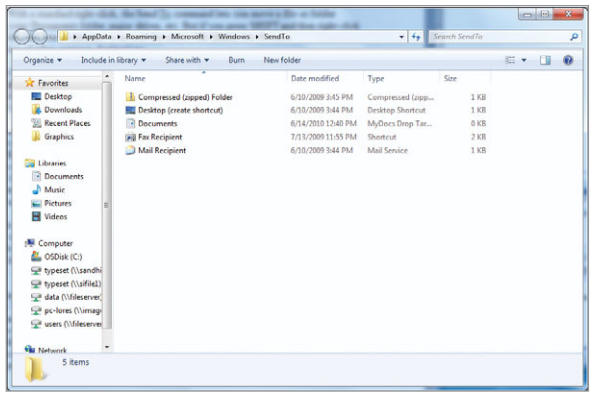
Super Send To

As most of you already know, holding down SHIFT when right-clicking a Desktop icon calls up an expanded menu of options. But one place where this super-sizing is useful is in the Send To submenu. With a standard right-click, the Send To command lets you move a

We're all still getting used to the new functionality and quirks of the Win7 Taskbar.
There's so much going on in the Taskbar now that we found having a few shortcuts and tweaks may make life easier.

file or folder directly to your Documents folder, major drives, etc. But if you press SHIFT and then right-click the file/folder, the Send To submenu mushrooms to include Favorites, My Music, My Pictures, and a number of other common destinations.

Need more? You can also customize the targets in the Send To context menu. In the Start Search box, type **shell:sendto** to open the folder of the same name. Then, simply create shortcuts to specific folders and drop them into this folder; this adds them to the list of basic destinations for the Send To context menu.



The Send To command in the context menu is really a simple folder of shortcuts to which you can add new destinations.

Use (& Recover From) BitLocker To Go

We've lost more USB thumbdrives than we can count, and who knows who now has access to the many files that were stored on them. Win7 Ultimate has protection built into the BitLocker tool, which encrypts and password-protects data written to an external drive. Insert a USB drive, right-click it, and click Enable BitLocker. This will walk you through a password-creation tool and then encrypt the drive. Anything you drag and drop onto the USB drive will now be encrypted and password-protected.

Right-click the same USB drive and find the Manage BitLocker command, which lets you remove or change the password, tell the current PC to automatically unlock this drive when it's inserted, or save and print the recovery key for the drive. The recovery key is a text file that contains a long string key that will unlock the drive—critical if you happen to forget the password.

At the login screen for the drive, clicking I Forgot My Password will initiate the recovery procedure. The next screen will give you the first eight digits of a longer key identification number that is unique to the drive you inserted. The BitLocker Recovery Key filename will include the full ID number of the matched drive. In that file, you will find the BitLocker Recovery Key number at the bottom of the text file, which you can copy and paste into the open field in the BitLocker window. This key will only give you temporary access to the files on the drive; the password will be enforced again when you reconnect the drive. ▲

by Steve Smith

Windows Tip Of The Month

If super hi-res displays are making it tougher and tougher to see your Desktop icons, or, conversely, if you want to shrink them down to reveal more of your wallpaper, remember that the CTRL-Mouse wheel zoom shortcut works in many contexts. On the Desktop, holding CTRL and scrolling the mouse wheel will enlarge or shrink your icons on the fly. The combo has the same effect in a folder.

Registry Tip Of The Month

File cleanup is one of those necessary chores that's easy to overlook because it requires drilling into the Control Panel or the Properties of a given drive. An old Registry hack is still one of the best ways to keep desk cleanup tasks more accessible in the right-click context menu for any drive. To do this in Regedit, go to the HKEY_CLASSES_ROOT\Drive\shell and make a new key. Name the key "diskcleanup." Right-click this new key and create another new key beneath it called "command." Double-click the Default Value this new key creates in the right-hand pane and enter "cleanmgr.exe /d %1" in the Value data area. Now, right-click a drive letter in Windows Explorer, and you will see a new Disk Cleanup option. Clicking the new item will run Disk Cleanup immediately on that drive.

Keep in mind there are two different states to the right-click menu, the standard right-click context menu and the "extended" context menu that appears with special commands when you hold down SHIFT when you right-click. If you want to stow the Clean Up command only in that extended menu, highlight the new HKEY_CLASSES_ROOT\Drive\shell\diskcleanup key you made, right-click it, and add a new string value named "Extended." This change will force the Disk Cleanup tool to appear in the extended right-click context menu only.

Infinite Loop

A Coffee Table Fit For An Old-School Gamer

Step aside, IKEA. You got nothin' on this fine home furnishing. This coffee table is the spitting image of the iconic NES controller and capable of really tying a room together to a degree not seen since the rug of one Jeff "The Dude" Lebowski. But the awesome does not stop there, oh 8-bit aficionados. This particular piece of furniture doubles as fully functional controller, adding a new, sadistic twist to finishing Battletoads with a friend.

Source: bit.ly/9x3OSE

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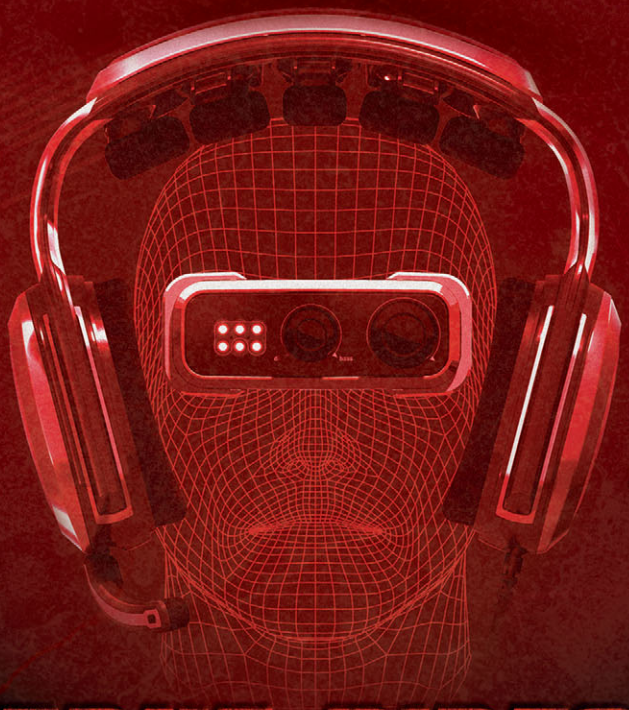

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For gamers, the phrase "5.1 surround sound" probably conjures simultaneous mental images of floor-standing speakers, crisscrossing speaker cables, and fragging the guy who'd been stalking you none-too-stealthily as you headed for your favorite weapon spawn. No doubt gamers love anything that can provide a significant advantage on the battlefield, but five speakers and a subwoofer are a logistical nightmare for most game rooms and utterly out of the question for LAN parties. But the Psyko 5.1 PC Gaming Headset takes everything you love about 6-channel surround-sound gaming and sticks it on your head.

> "takes everything you love about 6-channel surround-sound gaming and sticks it on your head."

Unlike other so-called surround-sound headsets that use algorithmic DSP (digital signal processing) to create a false surround-sound environment, the Psyko 5.1 headset features two front speakers, two rear speakers, a center channel, and two subwoofer drivers (one for each ear) integrated into the cans and headband of the headset. Framing all those powerful but compact speakers is a system of waveguides that channel the sound from each speaker to the appropriate sides of your ears to generate a realistic 360-degree soundscape. Because every listener's ears are shaped differently, sound enters the ear canals in minutely varied ways. But rather than trying to fake it, the Psyko 5.1 PC Gaming Headset delivers raw sound to your ears as that sound would be coming at you if you were physically inside the game world, so you hear it as naturally as possible, with zero latency. This headset also trumps a traditional 5.1 surround-sound speaker system by making your head the sweet spot. This is immersion like you've never heard it before. Gamers notice they play better with Psykos because they instantly know where every sound comes from.

> "This is immersion like you've never heard it before."

The Psyko 5.1 PC Gaming Headset is dressed to impress with red, silver, and slate-gray accents that highlight the innovative technology that makes them unique. Other features include a standalone volume and bass control box, an LED-based 5-channel directional indicator, pivoting ear cups that ventilate to keep your ears cool and vertical sliding cans for the perfect fit, and a detachable mic boom. The Psyko 5.1 PC Gaming Headset is $299.

> "pivoting ear cups that ventilate to keep your ears cool"

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by Mike Magee

Real Competition Is Finally Coming To CPU Market

AMD is much closer to creating its Fusion processors than Intel expected, and that appears to have caused the chip giant to re-assess the threat from the smaller chip player.

Intel was well aware of the threat a few years ago and started work on its Larrabee project to counter the impact a Fusion processor might have on its own technology. But it was forced to can Larrabee, hatched in Intel's R&D division, even though elements of it were still being developed.

However, recent Intel roadmaps leaked to the Web suggest that its Sandy Bridge technology is likely to contain some surprises for AMD—no doubt Intel hopes that they will be unpleasant surprises.

Currently, AMD has two Fusion processors on the starting blocks. Ontario, which is being manufactured by semiconductor foundry TSMC, is a low-power product that is already sampling and is aimed at the netbook and small-form-factor markets. As of press time, some of my contacts have already received samples, and initial benchmarks we've seen show very impressive results. The other processor, Llano, is delayed by a couple of months. It will be built by GlobalFoundries, the AMD spin-off financed by Abu Dhabi investor ATIC. Llano, we understand, is a far more impressive combination of CPU and GPU.

The problems with Llano have come about because it will be built using GlobalFoundries' 32nm process. Sources tell me that AMD had set a very aggressive target for Llano that couldn't be met because it wasn't a simple shrink of an existing die; Fusion Llano is an entirely new kind of processor and it's the combination of new process and new design that caused the delay.

More sources, this time from inside Intel, suggest it is very worried about this type of technology, too, although probably not nearly as worried as Nvidia. After all, there now seems to be a fight brewing between Intel and AMD that leaves Nvidia on the sidelines, watching helplessly as the game is played out over the next year or so.

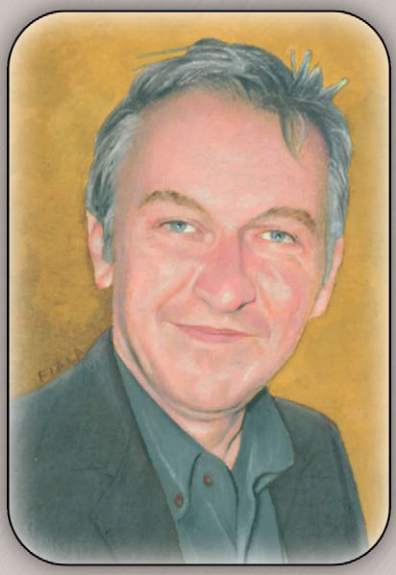
Intel's great hope rests on its technology called Sandy Bridge, a scalable successor to the current generation of Nehalem that is set to launch in Q4 and will put both the graphics processor and the CPU on one die. My sources indicate that Intel will improve Sandy Bridge's internal interconnects to match the speeds it suspects Llano will be capable of. It is also likely, according to several leaks, that Sandy Bridge will have an integrated graphics core that buzzes along at over 1GHz. Real-life performance figures aren't yet available, but Intel will most likely reveal most of its key metrics around the time you're reading this article.

One of the advantages that Intel has always had over AMD has been its ability to migrate to newer shrink technologies at good yields. Put quite simply, Intel's process technology is the gold standard, while other semiconductor companies—and I don't mean just AMD—lag behind in migrating to smaller line sizes.

But AMD is now a different kind of creature than it was before it absorbed ATI. Although ex-CEO Hector Ruiz came under a lot of criticism for buying ATI (including from yours truly), in hindsight this was probably the best move the company made since coming out with the original Opteron/Athlon designs, which left Intel in the dust.

One ex-AMD employee, and there are plenty of those around these days, described his old company as ATI under a different name. The ATI technologists, put baldly, really know their graphics processors while Intel has always had something of a problem attempting to put its ideas into silicon. I suspect that it will have trouble keeping up with Fusion, too, although AMD must not be judged by its first Ontario chip. It will be judged by Llano, which we presume is slated for release in the first quarter of 2011, if everything goes right.

In the meantime, and at long last, it looks like we'll have some real competition between the traditional CPU rivals. Personally, I can't wait. ▲



Mike Magee is an industry veteran. He cut his teeth on ancient products like the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER (www.theinquirer.net) in 2001. Mike recently started his own Web site, www.techeye.net. He continues to large it up for tgdaily.com, too.

Send rumours to "Mad Mike" Magee at mike@cpumag.com

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Technically Speaking

An Interview With Airvana's Josh Adelson

Josh Adelson is director of product marketing for Airvana, a leading provider of mobile broadband network infrastructure systems and femtocells. He's also editor of the Femto Hub, a comprehensive source of news and insight for the femtocell industry. He has an MBA from MIT's Sloan School of Management and a BA from Brown University.

by Barry Brenesal

CPU: Let's start out with a definition of femtocells, and then get to a few of the basics.

Adelson: A femtocell is a miniature, cellular base station, about the size of a Wi-Fi router. It provides excellent cellular service, including signal for voice and 3G data downloads inside a building, such as your home.

CPU: Would that be the main advantage to a home user?

Adelson: Cellular networks were not designed to provide service inside buildings. A lot of people have the experience where, when they go indoors, they find a very poor or inconsistent cell phone signal. So with a femtocell, you can get consistent, four-to-five bar experience throughout your home. You don't need to lean out the window, or perform unnatural contortions.

The other advantage to femtocells is they provide you with a much better mobile data experience. Airvana has conducted tests on this, and we found that, on average, with a femtocell you get a fivefold increase in data speed vs. the macro network alone.

CPU: What sort of equipment changes are required to get a home system up and running on a femtocell?

Adelson: Just the femtocell: That's it. The femtocell plugs in your home broadband connection, such as cable or DSL. But then it works with your standard mobile phone.

CPU: Isn't there a requirement for a GPS receiver to run with femtocells?

Adelson: There is in some instances. It varies by technology and also by country. In the U.S., there are two regulatory motivations. One is for E911 service. The GPS allows the E911 systems to know the origin of the call. The other—which I don't believe is a regulatory requirement, but it's something the mobile operators are more comfortable with—allows the operator to be sure that the femtocell does not get deployed in an area where they don't hold license for the spectrum it's operating in. Take an operator that may have a license for 1,900MHz in Dallas, Texas. If they move to northern Minnesota, perhaps they won't have that portion of the spectrum in the area.

CPU: What happens if a femtocell user decides to switch carriers?

Adelson: We usually think of a femtocell as carrier-specific. If you buy a Sprint Airave femtocell, it will work with your Sprint phone. It won't work with your Verizon or AT&T phone. Likewise, if you buy from those other operators. If you think about it from an operator perspective, it's a mini-tower onto their network.

CPU: Are the lack of good deals for customers among the reasons that femtocells have been touted as the coming technology, every year for the last five or six years, without actually arriving? These may be old figures, but Sprint has charged $100 for its femtocell, and mandates a $5 per month fee for simply using it, plus $10 to $20 per month for an unlimited calling plan, over and above your current calling plan. So Sprint customers end up paying almost $160 that first year for improved voice coverage at home.

Adelson: I think your numbers are correct, but you have to look at a few things. Even at $160 per year, if you consider what somebody's overall mobile phone bill is during that same period of time, it could easily be 10 times that amount. This is something that allows your mobile phone service to work better.

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The other thing is that, like any new technology, prices of products start high, and then they come down. I think we're already seeing that with femtocells. When Sprint first announced their femtocells, they cost approximately $250. We're seeing others that have come down, as well. It's just part of a natural market progression.

CPU: In your opinion, is there any truth to the argument that one of the problems with getting general acceptance for femtocells has been poor marketing?

Adelson: I would half agree with that statement. If you look at the marketing that's been done by operators around femtocells, you actually see some excellent examples and some less aggressive ones. This is a completely new product category, even on the residential side. I think operators are being naturally a bit conservative, and perhaps wisely so. They want to see people get comfortable with femtocells, and then factor that into more aggressive launches and marketing plans.

CPU: But how does one respond when Verizon says that a coverage expansion plan for $250 will improve your home reception, and the potential customer responds, "Well, why didn't you offer me improved reception all along?"

Adelson: The Femto Forum and Parks Associates just announced the results of a very extensive U.S. consumer survey. We hear—and I see it all the time, reading product reviews, articles, and blogs—this very complaint: "Why should I have to pay the operator again for something I've already paid for?" But what's interesting that they discovered in the survey is that the majority of people are actually willing to pay something for a femtocell when it's described to them with stated benefits. They provided a price, anywhere from $20 to $200. Most consumers seem to accept the fact that to acquire this premium level of service, essentially a private cell within their own home, is worth some investment.

CPU: Does the survey show that they're happy with the femtocell offers that are being presented at this time?

Adelson: What we saw is that most U.S. consumers don't have a high awareness of femtocells. They were asked to score their awareness of femtocells on a scale of 1 to 7, and most people were down at 1 or 2. The interesting thing was that those who were aware of femtocells liked the concept even if they didn't own one, and liked them better than those consumers who had only heard about them only because of the survey. They also showed a willingness to pay a higher price for femtocells.

CPU: Are there any results of surveys or focus groups indicating how people in possession of femtocells rate the product?

> What we saw is that most U.S. consumers don't have a high awareness of femtocells.
>
> —Josh Adelson

Adelson: The survey that I mentioned didn't specifically address that, but I've heard operators at industry conferences discussing surveys they've done among their own users. The data I've seen indicates that the rate at which femtocell users defect from their carrier drops markedly, suggesting femtocells considerably increase satisfaction with the operator. At a recent conference, a speaker from AT&T said that "How can I get a femtocell?" was one of the more frequent calls into their call centers. Operators are tracking this, and the anecdotal evidence that I've heard is very positive about femtocells.

CPU: So much for the present. Are you willing to speculate on what kind of growth we'll see in the near term for femtocell use?

Adelson: One way to look at it is the pace of operator launches. It's really accelerated. Sprint was the first operator in the world to launch a femtocell. That was back in the summer of 2008. A year later, there were only perhaps three or four more launches. Verizon launched—although as you note, they're kind of quiet about it. Vodafone launched in the UK. AT&T launched, and an operator in Singapore called StarHub. So in that first year, there were only four more launches. Since the summer of 2009, there have been six to eight, and now there are close to 15 operators who have either commercially launched femtocells or have made a public announcement that they plan to do so. The number of operator launches has really accelerated.

Another point is that some things happen in clusters. For example, in Japan, Softbank launched, then Docomo and KDDI. There's some evidence that there's a competitive dynamic going on here. If a single operator in a region launches, then the others feel like they need to. We're seeing some of that.

CPU: What technological developments are underway as far as improving the quality of the service?

Adelson: A lot of development—and you alluded to this before, in your questions concerning cost—is just a matter of silicon integration. Once you've got something working, you want to cost reduce it, and make it more mass producible. There's also some really interesting work going on to develop femtocell APIs. In order to have successful applications, you want to have industry-standard APIs; Airvana and other companies in the industry are working to build these so that application developers can use these to create new services using femtocells. This means you'll be able to have applications that are femtocell-aware, and take advantage of the femtocell to trigger things such as presence-related events, or to communicate between the mobile phone and the home network. ▲

by Anastasia Poland

Under Development

A Peek At What's Brewing In The Laboratory

The Living Earth Simulator, part of a large 10-year EU project, will utilize supercomputers similar to this cluster in order to mine global techno-socio-econo-enviro data and create simulations of those systems in order to study and forecast potential global crises.

Life On Earth, Super Simulated

Second Life doesn't have a thing on it. None of the Sims can touch it. Why? Because the Living Earth Simulator is bigger and better . . . and real.

One arm of FuturIcT, a far-reaching, 10-year, 1 billion euro-funded European Union program that will bring together "hundreds of the best scientists in Europe to explore social life on earth and everything it relates to," the Living Earth Simulator will gank our data to create ginormous simulations of our technological, sociological, economic, and environmental systems.

"The realization of the project will be based on supercomputing (most likely cloud or grid computing) and on reality mining, using new data sources (the Free Our Data initiative [www.freeourdata.org.uk], Internet, sensor network data, experiments on the Web and in the lab, etc.)," explains lead scientist and coordinator of FuturIcT, Dr. Dirk Helbing. "It will also require new interaction and co-creation tools, including social/serious/multiparticipant game-like environments (similar to Second Life, but with serious and useful applications that cannot be otherwise realized)."

Once data is gathered and turned into simulations exploring many possible scenarios, say, of a global financial crisis, the troubling outcomes that float to the top could be presented to policy makers. Once these experts have hashed through the issues and created policies designed to mitigate a crisis, those policies can "be implemented first in massive online multiplayer games," Helbing says. "In these 'parallel worlds,' it could be tested in advance, whether the policies have the expected effects or not." These "games" could reveal unanticipated solutions or shoot holes in expected results.

"After this testing stage, the results of the different computer scenarios and Second Life parallel world experiments would be presented to decision makers in a Decision Theater," explains Helbing. "Based on political priorities and considering normative/moral issues, they could take a better-substantiated decision."

The Living Earth Simulator will work hand in hand with the two other branches of FuturIcT's directive—Crisis Observatories and an Innovation Accelerator. Helbing explains the two: "Crisis Observatories [are] for financial instabilities, scarcity of resources, evacuation scenarios, emerging risks and conflicts, epidemics, etc." whereas the Innovation Accelerator works on "identifying innovations early on, evaluating them across disciplines and supporting co-creation projects between different scientific disciplines, business, and governance." In the end, the program hopes to provide holistic, integrated views of global systems issues and their impact on the environment, with workable, tested, and proven solutions.

The layers of the project, and the potential global impact, are massive. With more than 200 teams in EU and branches of research clusters reaching across the globe, 10 years may seem like a very short time to accomplish their goals. ▲

Carbon Nanotubes Transform Paper Into Fuel

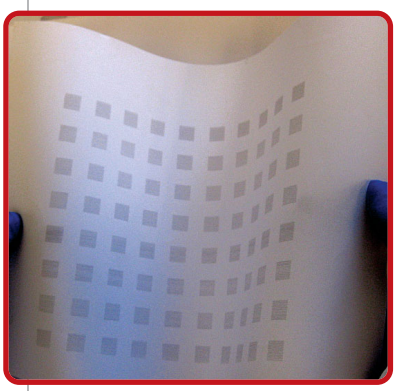
In these extreme tech times, new electronics are flowing to the market in a fast and furious fashion, yet one thing still stymies scientists in new product development—and that is having an energy source that can keep up with their inventions. Neither batteries nor fuel storage has been able to meet the needs of the increasingly demanding electronics market.

Researchers at Stanford University are working on meeting that need with their latest creation, a paper supercapacitor. Simply coating paper with a solution of single-walled, "conductive, porous carbon nanotubes" and silver nanowires, the researchers have been able to store an electrical charge on the paper, explains postdoctoral fellow Liangbing Hu, one of the leads on the project.

"We take the combinational advantage of nanotechnology (carbon nanotubes), and old technology (paper), to make a porous structure for charge storage. The amount of charge stored is proportional to the surface area of the porous structure," he says. The carbon nanotubes contain all the elements needed to create an efficient, low-cost, closed system for electrical storage.

The beauty of supercapacitors is that they have a very long life, have high rates of charge and discharge, are safer than batteries because of their low voltage, charge easily, and can't be overcharged. The team has tested the durability of their invention by crumpling the paper, folding it, and dipping it in liquids of both acidic and basic nature; the supercapacitor kept on ticking.

The potential uses for the device are varied, explains Hu. "These paper supercapacitors can be used to power up consumer electronic devices, such as paper displays or sensors. When it is combined with pseudocapacitor materials [in this instance, Hu and the research team used manganese dioxide because of its low cost and effective performance], the paper supercapacitor can also be used for large-scale energy storage, for example, for grid energy storage applications." Hu's professor, Yi Cui, notes that walls could be painted with the carbon nanotubes to power devices, and that wind farms and solar energy developers may be interested in his team's simple, yet efficient, storage system. Hu mentions that the team has also made batteries by a similar process.



Stanford University researchers have coated common paper with a carbon nanotube-infused solution to create supercapacitors that efficiently store charges.

The team has filed for a patent and continues to work on improving the performance of the supercapacitor. ▲

Virtual ViroLab Drives Data To Infectious Disease Doctors

Infectious diseases are a quandary for the medical community—personalizing, if you will, as they leap from host to host, making treatment intensely time-consuming and leaving researchers mired in guesswork. HIV, for example, is particularly difficult as the mutations can be swift and treatment hindered due to rapid drug resistance.

ViroLab Virtual Laboratory opens up huge channels of data for those working on infectious diseases, allowing for more informed decision-making and treatment.

Peter Sloot, professor of computational science at the University of Amsterdam, was struck by this challenge 10 years ago, talking to a virologist at a conference about the multifold issues dealing with the combination of antiretroviral drugs, patients' medical particulars, and innumerable strains of the virus. His epiphanic solution appeared in the form of the ViroLab Virtual Laboratory, an online tool that lets medical researchers, doctors, computer scientists, and organizations access broad and deep streams of data for consultation purposes.

The vision is to have "easy access to distributed resources as well as sharing, processing and analyzing virological, immunological, clinical and experimental data," according to the mission statement. The end product will be informed support for decision-making that clinicians and researchers have not had up until this time.

ViroLab is set up to spider through masses of open databases, drawing information from scientific journals plus data on viruses, immunities, clinical studies, genetics, and scientific trial results across the planet. For a particular patient, the system will sort through all the data above, combined with the patient's medical history, sociological information, and current disease profile. The system will then issue a ranked list of drugs applicable to the patient's needs, including the estimated success rate of the drug and possible impact on the patient. The system will also track doctors' research and drug therapy recommendation for an individual step-by-step, along with the system's own pathway in delivering recommendations.

ViroLab's prototype currently focuses on personalized HIV treatment (specializing in drug resistance) because of the depth and availability of data. However, ViroLab is built to scale up and host all infectious diseases. The team plans to develop tools in the future that will assist users in their statistical analyses and in modeling and simulating a disease's sophisticated mutations, with an eye on predicting how viruses might respond to a variety of drug therapies. ▲

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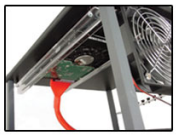
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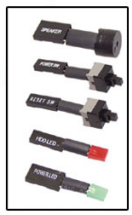
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lanfest.intel.com
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lanlordz.net
10.16.10
SLAGG - Bradenton, FL
www.slagg.org
TigerLAN 22 - Hays, KS
tigerlan.net
10.23.10
BHN of Tampa LAN 2010 - Largo, FL
tampa.bhngaming.com/lan
Ham LAN - Hamilton, OH
www.ham-lan.com
LAN Kansas - Wichita, KS
www.lankansas.com
Oklahoma Gamers Group - Oklahoma City, OK
www.okgg.org
WV Gamers - Eugene, OR
www.wvgamers.com
10.29.10
CryoLAN Party: Red Oktober - Lockport, NY
www.cryolanparty.com
10.30.10
Halloween LANCryption - Whittier, CA
www.lancryption.com
11.05.10
UberCon XIII - Edison, NJ
www.ubercon.com
11.06.10
Aggro LAN - Cuyahoga Falls, OH
www.aggrolan.com

Rapid Response LAN party - Trenton, NJ
www.lanaddict.com/lan/view.php?LANID=2237 and
www.lanpartylist.com/list.php?cat_id=34
11.10.10
LAN Lordz - Wichita, KS
lanlordz.net
11.12.10
TusLAN - Tucson, AZ
www.tuslan.net
11.20.10
LAN Kansas - Wichita, KS
www.lankansas.com
Oklahoma Gamers Group - Oklahoma City, OK
www.okgg.org
SLAGG - Bradenton, FL
www.slagg.org
WV Gamers - Eugene, OR
www.wvgamers.com
11.26.10
Black FragDay - Waverly, TN
www.lanpartymap.com/tennessee-lan-party/
1554-Compleetly-Reborn.html
12.03.10
Maryland LAN Gamers - Maryland
www.marylandlangamers.net
12.04.10
Rapid Response LAN party - Trenton, NJ
www.lanaddict.com/lan/view.php?LANID=2237
www.lanpartylist.com/list.php?cat_id=34
12.11.10
LAN Lordz - Wichita, KS
lanlordz.net
12.18.10
Oklahoma Gamers Group - Oklahoma City, OK
www.okgg.org
SLAGG - Bradenton, FL
www.slagg.org
01.01.11
MagFest - Charlottesville, VA
magfest.org/index.php
01.14.11
Kansas LAN - Lyons, KS
www.kansaslan.com

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Q&A With Mark Coker

Smashwords' CEO Rewrites The Book On Books

In July, Amazon announced that books for its Kindle ereader platform were finally outselling hardcovers. After years of big promises and market frustration, ebooks seem to be taking hold at last, led by Amazon, Apple, Sony, Barnes & Noble, and others. One ebook retailer you might not have encountered is Smashwords (www.smashwords.com), which not only sells ebooks but also distributes them to the larger retailers. Smashwords CEO Mark Coker stands near the eye of the ebook storm and has an intimate view of how this transition to digital will be the biggest change in reading since the invention of the printing press.

Q Should old-school publishing companies be worried about ebooks?

MC All media should be worried, but maybe "worried" isn't the right word. These new formats represent both a threat and an opportunity to existing media. You know they're a threat if existing media takes a bunker mentality and tries to avoid facing these new formats. They're an opportunity if publishers jump on them. It's all about finding new ways to reach and satisfy readers.

Q Why did you start Smashwords?

MC My wife and I wrote a novel called "Boob Tube" and got represented by one of the top literary agencies in New York City. That agency shopped the book around for two years and was unable to sell it. That was pretty upsetting to us after investing thousands of hours in this book. We felt, "How dare a publisher stand in the way between us and our audience?" Let the readers decide if this book is worth reading, not some lemming in a New York office tower.

It was the experience with "Boob Tube" that made me think something is fundamentally broken here in the industry. So I came up with the idea of Smashwords, where we would let any author in the world upload a finished manuscript as a Microsoft Word document. Our technology would automatically convert that into multiple ebook formats so that the book can be read on any ebook device. Then, let authors set the price. Let them own their books. We pay them 85% of the net. That was the idea, and that's what we launched a little over two years ago.

Q Where does the name "Smashwords" come from?

MC Writing is a very destructive process. You write, you edit, you cut/paste/delete. You wrestle with those words until you get them to behave as you want. That's part of it, the violence of writing. So that's the inspiration behind "smash." There's also the other side of the word, like "smash hit," the idea of success.

Q Why did ebooks and ereaders always seem to struggle until recently?

MC Well, ebooks came on the scene in a big way about 10 years ago and failed to live up to expectations for a bunch of different reasons. The screen technology was not very good, so paper remained a much more pleasant reading experience. The books were overpriced. Publishers were charging full print prices. The ebooks themselves were saddled with really cumbersome DRM. The amount of content was also limited. So people wrote off ebooks, even though sales continued to grow every year.

All of that started to change as the technology improved. Ever since Amazon launched the Kindle, it's been at the center of their home page, right in front of all these people who are used to buying books online. With Amazon's success, you've seen a lot more players come in with new devices, practically every week. And the more readers you have, the more people are going to be interested in ebooks.

Q How are ebooks going to change the world?

MC Print is too expensive for the vast majority of the world's literate population. The growth of literacy is happening in developing countries, not the United States. These folks are only surviving on $2 or $3 per day, but they have a cell phone . . . an e-reading device. Soon there will be billions of ebook-ready devices in everyone's hands, and all of those people are potential readers. Ebooks are going to push forward this virtuous cycle: more books, more knowledge, better cross-cultural understanding. ▲

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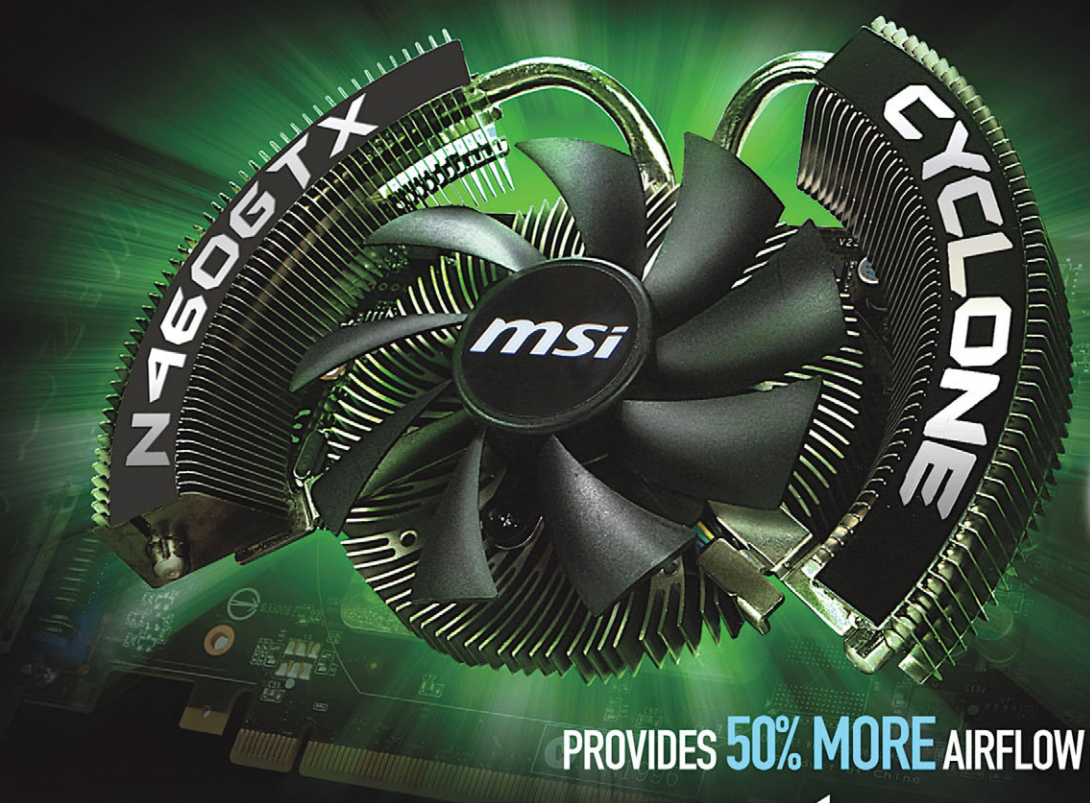

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